ENVIRONMENTAL STRATEGIES CORPORATION

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2001 INTERIM GROUNDWATER MONITORING REPORT
FORMER WASTE PIT AREA
BUCKEYE RECLAMATION LANDFILL
BELMONT COUNTY, OHIO

PREPARED

BY

ENVIRONMENTAL STRATEGIES CORPORATION

OCTOBER 17, 2001

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ENVIRONMENTAL STRATEGIES CORPORATION

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October 17, 2001

Mr George Gleich
Buckeye Reclamation Project Coordinator
CONSOL, Inc
Consol Plaza
EQC Department
1800 Washington Road
Pittsburgh, PA 15241-1421

Re 2001 Interim Groundwater Monitoring Report
Former Waste Pit Area
Buckeye Reclamation Landfill, Belmont County, Ohio

Dear Mr Gleich

Enclosed is a copy of the 2001 Interim Groundwater Monitoring report for the Buckeye Reclamation Landfill (BRL) site This report covers groundwater quality sampling and the measurement of groundwater levels in monitoring wells and piezometers located in the former waste pit area. Environmental Strategies Corporation (ESC) performed the field activities between July 17 and August 7, 2001

We look forward to continuing our efforts with you and Baker and Associates on the successful completion of the BRL project

Should you have any questions or comments regarding the 2001 Interim Monitoring report, please do not hesitate to contact us

Sincerely yours,

E. Michael Riggins

E Michael Riggins, P G
Technical Manager

EMR lmk

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cc Lois Muller, P E , Baker and Associates, Coraopolis, PA
Jan Chizzonite, ESC, Reston, VA

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List of Acronyms

AMD	Acid Mine Drainage
AMSL	Above Mean Sea Level
B2EHP	Bis(2-ethylhexyl)phthalate
BCHD	Belmont County Health Department
BOD	Biological Oxygen Demand
BRL	Buckeye Reclamation Landfill
CLP	Contract Laboratory Program
COD	Chemical Oxygen Demand
DO	Dissolved Oxygen
EPA	U S Environmental Protection Agency
ESC	Environmental Strategies Corporation
GWMP	Groundwater Monitoring Program
GWMPS	Groundwater Monitoring Plan Summary
MCAWW	Methods for Chemical Analysis of Water and Wastes
MCL	Maximum Contaminant Level
MS/MSD	Matrix Spike/Matrix Spike Duplicate
NPL	National Priorities List
NTUs	Nephelometric Turbidity Units
OEPA	Ohio Environmental Protection Agency
ORP/Eh	Oxidation Reduction Potential
PAHs	Polycyclic Aromatic Hydrocarbons
PID	Photoionization Detector
PPE	Personal Protective Equipment
PQL	Practical Quantitation Limit
PVC	Polyvinyl Chloride
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QA/QC	Quality Assurance/Quality Control
QC	Quality Control
QED	QED Environmental Systems
RA	Remedial Action
RD	Remedial Design
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
SMCL	Secondary Maximum Contaminant Level
SOP	Standard Operating Procedure
SHS	Supplemental Hydrogeologic Study
STL	Severn Trent Laboratories, Inc
TDS	Total Dissolved Solids
TOC	Total Organic Carbon

List of Acronyms
(continued)

TSS	Total Suspended Solids
WC	Waynesburg Coal
WL	Wegee Limestone
WPAHI	Waste Pit Area Hydrogeologic Investigation
US	Uniontown Sandstone
VOCs	Volatile Organic Compounds

Executive Summary

The purpose of the 2001 interim groundwater monitoring for the Buckeye Reclamation Landfill (BRL) was to collect groundwater quality samples and measure water levels from piezometers and monitoring wells installed in the former waste pit area that are part of the long-term monitoring effort During July and August 2001, groundwater quality samples and water level measurements were collected from seven piezometers and two monitoring wells screened in the Wegee Limestone Waynesburg Coal, and Uniontown Sandstone water-bearing horizons in the former waste pit area. Two monitoring wells and one piezometer are installed in the Wegee Limestone, three piezometers are completed in the Waynesburg Coal, and three piezometers are installed in the Uniontown Sandstone

Water level data were used to determine groundwater elevations for each water-bearing horizon Groundwater flow in the Wegee Limestone was towards the northeast Groundwater in the Waynesburg Coal horizon was determined to flow north-northwest Groundwater elevations in the Uniontown Sandstone piezometers indicated groundwater flow toward the west

The collected groundwater quality samples were analyzed for volatile organic compounds (VOCs) bis(2-ethylhexyl)phthalate (B2EHP), polycyclic aromatic hydrocarbons (PAHs), total and dissolved metals acidity, alkalinity total organic carbon (TOC) chloride cyanide (amenable, free and total) biochemical oxygen demand (BOD), chemical oxygen demand (COD), nitrate-nitrite nitrogen, ammonia nitrogen, oil and grease, total dissolved solids (TDS), total suspended solids (TSS) sulfate total sulfide, total phosphorus and turbidity Field parameters measured during the sampling activities included pH, specific conductance, temperature turbidity dissolved oxygen (DO) and oxidation reduction potential (ORP/Eh) in accordance with the U S Environmental Protection Agency (EPA) approved interim groundwater monitoring plan summary (GWMPS) and the conditionally approved Final Groundwater Monitoring Program (GWMP)

Nine groundwater quality samples and a duplicate sample were collected from the piezometers and monitoring wells Laboratory data indicate that no PAHs were detected above practical quantitation limits (PQLs) of the analytical method or Maximum Contaminant Levels (MCLs) in the groundwater quality samples Acetone was detected in P-23-WC and P-27-US,

above the quantitation limit of the analytical method, at concentrations of 11 micrograms per liter (µg/l) and 25 µg/l, respectively The acetone concentrations were qualified as probable blank contamination after completion of the quality assurance/quality control (QA/QC) review 2-Butanone was detected in P-23-WC at an estimated concentration of 12 µg/l Estimated concentrations of toluene were reported in P-26-US (1 3 µg/l) and P-27-US (1 3 µg/l) Benzene concentrations that exceed its MCL were detected in P-26-US (5 3 µg/l) and P-27-US (18 µg/l)

B2EHP concentrations (15 µg/l 5 8 µg/l and 50 µg/l respectively) were detected in the two Wegee Limestone monitoring wells (MW-3AA-WL and MW-5AA-WL) and the duplicate sample (P-30-GW) collected from piezometer P-19-WL at concentrations above the PQL of the analytical method Concentrations of B2EHP were reported in P-23-WC (7 7 µg/l) and P-24-WC (14 µg/l) B2EHP was also detected in P-27-US (6 6 µg/l) and P-28-US 94 µg/l) After completion of the QA/QC review the concentration of B2EHP in P-23-WC was qualified as an estimated value while the B2EHP concentrations in MW-3AA-WL, MW-5AA-WL P-30-GW P-23-WC P-24-WC and P-27-US were qualified as attributed to blank contamination The B2EHP concentration in P-28-US was reported from a diluted sample

Total arsenic and dissolved arsenic concentrations were reported at concentrations above applicable MCLs in piezometer P 26-US Total and dissolved concentrations of iron and manganese in groundwater quality samples collected from the two monitoring wells and six piezometers except P-27-US were reported at concentrations above applicable Secondary MCLs (SMCLs) The reported thallium concentration in P-23-WC exceeds its MCL However the reported thallium concentration in P-23-WC and iron concentrations in MW-3AA-WL MW 5AA-WL, P-19-WL P-30-GW (duplicate of P-19-WL) P-24-WC, P-25-WC and P-28-US were qualified as estimated concentrations after QA/QC review Reported concentrations of sulfate in P-28-US total dissolved solids (TDS) and turbidity in the two monitoring wells and six of the piezometers (with the exception of P-27-US) from each water-bearing horizon exceed SMCLs and the EPA proposed (January 1, 2002) MCL for turbidity

The general absence of organic analytes indicates that the Wegee Limestone Waynesburg Coal, and Uniontown Sandstone water-bearing horizons in the former waste pit area are not affected or are only marginally affected by organic materials disposed of at the site

Inorganic parameters analyzed suggest that landfill leachate may be marginally affecting groundwater quality in the Wegee Limestone Waynesburg Coal, and Uniontown Sandstone water-bearing horizons Inorganic constituents (i e , iron manganese, sulfate, and total dissolved solids) indicate that the Wegee Limestone Waynesburg Coal, and Uniontown Sandstone horizons are probably affected by acid mine drainage (AMD)

1 0 Introduction

This report documents the results of the July and August 2001 interim groundwater monitoring conducted at the Buckeye Reclamation Landfill (BRL) site on monitoring wells and piezometers located in the former waste pit area The work was conducted in accordance with the interim groundwater monitoring plan summary (GWMPS) presented in the April 22 1997 correspondence from George Gleich, BRL Project Coordinator, to the U S Environmental Protection Agency (EPA) and protocols in the Final Groundwater Monitoring Program (GWMP) The GWMPS was approved by the EPA and the Ohio EPA (OEPA) by letter dated April 23 1997 The GWMP (Revision 2) was submitted to EPA on July 31 2001 and has been conditionally approved by EPA

The field activities were conducted in accordance with the scope of work presented in the GWMP (ESC 2001b)

1 1 Scope and Purpose of Study

The purpose of the 2001 interim groundwater monitoring was to collect one round of groundwater quality samples and measure groundwater levels from piezometers and monitoring wells installed in the former waste pit area at the BRL site Groundwater quality samples and water levels were collected from monitoring wells MW-3AA-WL and MW-5AA-WL and piezometer P-19-WL installed in the Wegee Limestone (WL), piezometers P-23-WC, P-24-WC, and P-25-WC installed in the Waynesburg Coal (WC) and piezometers P-26-US, P-27-US and P-28-US completed in the Uniontown Sandstone (US)

The collected groundwater quality samples were analyzed for the constituents listed in Table 1-1 The majority of these constituents were included in the EPA approved GWMPS The GWMPS was included as Appendix B in the GWMP (ESC, 2001b) and will not be duplicated in this report Water quality analyses were performed by STL-Pittsburgh, an EPA Contract Laboratory Program (CLP) member STL-Pittsburgh is also certified to analyze samples from Ohio sanitary landfills

The water level data were used to construct potentiometric surface maps and to determine groundwater flow directions in the WL WC and US water-bearing horizons in the vicinity of the former waste pit area

1 2 Interim Groundwater Monitoring

The results of the 2001 interim groundwater monitoring are presented in this report in accordance with the scope of work described in the GWMP Environmental Strategies Corporation (ESC) collected groundwater quality samples and measured water levels in seven piezometers and two monitoring wells between July 17 and August 7, 2001

This report provides a summary and evaluation of the hydrogeologic (i e water levels and groundwater flow directions) and analytical (i e , groundwater quality) data collected during the 2001 interim groundwater monitoring activities Potentiometric surface maps for the WL WC and US in the vicinity of the former waste pit area, are presented based on water level data collected on August 6, 2001

1.3 Site Location and Description

The BRL site is part of a 658-acre tract of land located off State Route 214 approximately 4 miles southeast of St Clairsville, in Richland Township, Belmont County, Ohio (Figure 1-1) The western intersection of Interstates 70 and 470 is located just north of the landfill access roadway The BRL site is situated in the Kings Run valley, is bordered by Kings Run to the east and the valley of Unnamed Run to the west. Kings Run flows to the south and empties into Little McMahon Creek west of the village of Neffs Ohio The BRL landfill extends approximately 3,700 feet north to south and is approximately 500 to 1,000 feet in width The BRL site occupies approximately 100 acres of the 658-acre tract of land

The original topography of the Kings Run valley has been altered by mine refuse and mine spoil (gob) disposal landfill operations and remedial action (RA) activities performed under the EPA Superfund program The Phase I RA activities included the construction of a solid waste landfill cap, a vegetated cap over the northern recharge area drainage and backfilling of the northern impoundment, and re-alignment and construction of a new lined stream channel for Kings Run

Before 1950 the BRL site was used as a disposal area for underground coal mine refuse and spoil materials Mine refuse was disposed of on the ridge west of Kings Run and in the Kings Run valley The BRL site was licensed as a public solid waste landfill in 1971 by the Belmont County Health Department (BCHD) and was operated as the Buckeye Reclamation Landfill or Belmont County Landfill As a county landfill, the facility accepted trash, rubbish and other material from local municipalities and villages

Between 1976 and 1979 the BRL site accepted industrial sludges and liquid wastes The liquid and sludge disposal was confined to an area in the northern portion of the site known as the waste pit The waste pit area was closed during 1980

In the early 1980s EPA and OEPA conducted preliminary investigations to assess potential public health and environmental risks posed by the BRL site The BRL site was placed on the National Priorities List (NPL) in September 1983 Since being placed on the NPL, extensive remedial investigation (RI) and remedial design (RD) studies and activities have been performed at the BRL site to characterize potential hazardous site conditions

1 4 Remaining Sections of this Interim Report

The following sections of this 2001 Interim Groundwater Monitoring Report include 2 0 Hydrogeologic Methods, 3 0 Hydrogeologic Investigation Results, 4 0 Groundwater Sampling Procedures and Results, 5 0 Conclusions and 6 0 References All tables, figures and appendices are also included with this report

2 0 Hydrogeologic Methods

Between July 17 and August 7 2001, groundwater quality samples and water levels were collected from seven piezometers (P-19-WL P 23-WC, P-24-WC, P-25-WC, P-26-US P-27-US and P-28-US) and two monitoring wells (MW-3AA-WL and MW-5AA-WL) installed in the vicinity of the former waste pit area The locations of the interim groundwater monitoring piezometers and monitoring wells are shown on Figure 2-1 The piezometers and monitoring wells from which groundwater quality samples and water levels were collected were re-surveyed by a registered and licensed Ohio surveyor contracted by the RA Phase I contractor for vertical elevations during August 2001 The methods used to conduct the 2001 interim groundwater monitoring are those described in the GWMP (ESC 2001b) as conditionally approved by the EPA Pertinent monitoring well and piezometer construction data, such as reference elevations screened interval, total depth, and the monitoring interval are presented in Table 2-1

Piezometer P-19-WL (formerly noted as P-19) was installed in the WL by ESC during the 1992 Supplemental Hydrogeologic Study (SHS) Piezometers P-23-WC, P-24-WC and P-25-WC (formerly P-23, P-24, and P-25 respectively) were completed in the WC horizon by ESC during the Waste Pit Area Hydrogeologic Investigation (WPAHI ESC 1998a) ESC also installed piezometers P-26-US P-27-US, and P-28-US (formerly P-26 P-27 and P-28, respectively) in the US horizon during the WPAHI The WL monitoring wells (MW-3AA-WL and MW-5AA-WL) were installed during the Remedial Investigation/Feasibility Study (RI/FS) hydrogeologic investigations and formerly noted as MW-3AA and MW-5AA respectively

2 1 Decontamination Procedures and Investigation Derived Waste Handling

Rinsewater and decontamination water generated during the equipment decontamination process were collected in 55-gallon metal drums and transported to the P-23-WC and P-26-US piezometer area and the generated liquids were placed beneath the RA Phase I constructed cap All purge water removed from the piezometers and monitoring wells before collection of the groundwater quality samples was transported from the wellhead area and placed beneath the landfill cap The total amount of water (rinsewater decontamination water and purge water) placed beneath the cap was approximately 50 gallons All personal protective equipment (PPE)

used during the 2001 interim groundwater monitoring field activities was double-bagged and placed beneath the landfill cap in the vicinity of piezometers P-23-WC and P-26-US This small amount of water and PPE could be placed beneath the cap because piezometer repair activities were going on at the time of the groundwater sampling and the landfill cap had been removed in the vicinity of P-23-WC and P-26-US

3 0 Hydrogeologic Investigation Results

3 1 Results of Groundwater Level Measurements

Before sampling was initiated at each piezometer or monitoring well, ESC inspected the monitoring well or piezometer to be sampled and measured the depth to water and total depth of the well with an electronic water level indicator The probe and the tape of the water level indicator were decontaminated with deionized water after each use Each piezometer or monitoring well was monitored when first opened with a photoionization detector (PID) equipped with an 11 7 eV lamp to measure for the presence of organic vapors

Groundwater elevations top of polyvinyl chloride (PVC) casing reference elevations and depth to water measurements measured in the piezometers and monitoring wells on August 6 2001 are presented in Table 3-1 In general the 2001 measured groundwater levels decreased in the WL monitoring wells and piezometer the WC piezometers and piezometer P-27-US compared to groundwater levels measured on June 22 1998 (Table 3-1) during performance of the WPAHI (ESC 1998a) Groundwater levels in US piezometers P-26-US and P-28-US increased when compared to the June 22 1998 WPAHI data

3 2 Hydrogeology of Former Waste Pit Area

3 2 1 Wegee Limestone

Groundwater elevations recorded on August 6 2001 for the WL range from a minimum of 1 080 34 feet above mean sea level (AMSL) in P-19-WL to a maximum of 1 083 00 feet AMSL in MW-5AA-WL (Table 3-1) The inferred potentiometric surface contours for the WL based on the August 2001 data are shown on Figure 3-1 The water level data indicate that groundwater flow through the WL is toward the northeast

3 2 2 Waynesburg Coal

Groundwater elevations recorded on August 6 2001 for the WC range from a minimum of 1,051 10 feet AMSL in P-23-WC to a maximum of 1 052 08 feet AMSL in P-25-WC (Table 3-1) The inferred potentiometric surface contours for the WC based on the August 2001 data,

are shown on Figure 3-2 The groundwater elevation data indicate that groundwater flow through the WC is toward the north-northwest

3 2 3 Uniontown Sandstone

Groundwater elevations recorded on August 6, 2001 ranged from a minimum of 1 012 10 feet AMSL in P-27-US to a maximum of 1,028 84 feet AMSL in P-28-US The inferred potentiometric surface contours for the US Formation in the vicinity of the former waste pit area, based on the August 2001 data are shown on Figure 3-3 These data indicated that groundwater flow in the US was westward toward the ridge top separating the Kings Run and Unnamed Run valleys

Groundwater flow directions in the WL, WC and US formations may be affected by factors that include fractures, joints bedding planes, stratigraphic facies changes, inclination of the bedrock horizons, stratigraphic positioning of permeable and impermeable bedrock horizons, the physical continuity of any specific water-bearing horizon, and the RA constructed landfill and soil caps Because of these factors, or a combination of these factors the direction of groundwater flow in any specific bedrock horizon may be locally different than that depicted on the potentiometric surface contour map

4 0 Groundwater Sampling Procedures and Results

4 1 Sampling Locations and Parameters

The groundwater quality samples collected from the seven piezometers and two monitoring wells were analyzed using U S EPA SW-846 methods Methods for Chemical Analysis of Water and Waste (MCAWW), and quality assurance/quality control (QA/QC) procedures described in the GWMP and the companion Quality Assurance Project Plan (QAPP) The collected groundwater quality samples were analyzed by STL-Pittsburgh for the constituents listed in Table 1-1 in accordance with OEPA Solid Waste Regulations 3745-27-10, regulatory agency requests, and the GWMP The VOCs, PAHs and B2EHP constituents were analyzed by EPA SW-846 8260 and 8270 methods respectively The metals were analyzed by EPA SW-846 Method 6010 The inorganic parameters, with the exception of cyanide were analyzed by EPA MCAWW Methods 310 1 350 1, 410 4, 325 2 353 2, 375 4, 160 1, 180 1 365 2, 305 1, 413 1 415 1 405 1 and 160 2 Total and amenable cyanide samples were analyzed using SW-846 9012 methods and free cyanide was determined using SM-18 4500-CN I methods

Sample containers for VOCs total and dissolved metals ammonia, COD, nitrate-nitrite TOC, sulfide total phosphorous and oil and grease were received from the laboratory with the appropriate preservative All sample coolers were maintained at 4 degrees Celsius (°C) and transported to the analytical laboratory by overnight delivery service In addition to the laboratory analysis listed above, the groundwater quality samples were analyzed in the field, using a flow through cell, for the following parameters

- temperature
- pH
- specific conductance
- turbidity
- dissolved oxygen (DO)
- oxidation reduction potential (ORP/Eh)

4.2 Sampling Procedures

After recording the depth to water and total depth of each monitoring well or piezometer a low-flow bladder pump equipped with dedicated tubing was used to purge and collect the groundwater quality samples from the piezometers and monitoring wells A QED Environmental Systems (QED) Sample Pro portable micropurge pump equipped with a Teflon bladder was used during the 2001 interim monitoring activities The air supply and discharge lines from the bladder pump consisted of Teflon-lined polyethylene tubing. The air supply and discharge line tubing was dedicated to each piezometer or monitoring well as described in the GWMP During the 2001 interim monitoring activities the bladder pump was connected to the dedicated tubing used to purge groundwater collect the groundwater quality samples and then removed from the piezometer or monitoring well The bladder in the pump was replaced with a new unused Teflon bladder and the pump housing decontaminated before placing the bladder pump in the next piezometer or monitoring well In accordance with EPA protocols regarding low-flow purging techniques the bladder pump inlet was positioned at the mid-screen length of the piezometer or monitoring well Groundwater was purged from each piezometer or monitoring well until the field parameters stabilized over three successive readings All purge water was placed in plastic 5-gallon containers transported from the wellhead, placed in a 55-gallon metal drum and ultimately placed beneath the RA landfill cap in the area of piezometers P-23-WC and P-26-US

The bladder pump purge rate was adjusted as necessary to result in producing minimal disturbance to the water-bearing horizon Groundwater was purged from the monitoring well or piezometer, in accordance with Standard Operating Procedure (SOP) 3C (Appendix D of the GWMP), until the field parameters (i e , pH specific conductance, temperature, turbidity, DO and ORP/Eh) stabilized in the purged groundwater After the field parameters stabilized, groundwater quality samples were collected from the bladder pump discharge line for laboratory analysis

A QED Model MP20 micropurge basics flow through cell was used to measure pH temperature specific conductance, DO, and ORP/Eh Turbidity readings were determined using a Horiba U-10 water quality meter The field measurements collected from the final (i e third) stabilized purge volume are presented in Table 4-1

After the field parameters stabilized groundwater quality samples for laboratory analysis were collected directly from the Teflon-lined dedicated bladder pump discharge tubing The groundwater quality samples were collected in the order specified in SOP 2 (Appendix D) of the GWMP

During the 2001 interim monitoring activities, purging or groundwater sampling procedures resulted in lowering the groundwater levels in P-26-US and P-27-US to the bladder pump intake such that additional groundwater could not be recovered from these piezometers The air and discharge lines were removed from P-26-US and the necessary groundwater recovered from the discharge tubing to complete the collection of the groundwater quality samples However a complete suite of groundwater quality samples could not be collected from P-27-US during the 2001 monitoring activities even after allowing the piezometer to recharge over several days Groundwater quality samples that were not collected from P-27-US include total and dissolved metals, total acidity cyanide (amenable free, and total) BOD COD, nitrate-nitrite, ammonia nitrogen TDS, TSS sulfide, total phosphorous, and turbidity Water levels were measured in P-26-US and P-27-US on September 11 2001 to determine whether these two piezometers had recharged since the August 2001 sampling event On September 11, 2001 P-26-US contained approximately 1 3 feet of water and P-27-US contained approximately 3 1 feet of groundwater

Based on the September groundwater levels, during performance of the first long-term monitoring event new dedicated tubing will be installed in P-26-US and P-27-US such that the dedicated bladder pump intake is lowered and will be positioned approximately 6 to 12 inches above the piezometer bottom The piezometers will be purged and groundwater quality samples collected until the water column height in these piezometers drops to the level of the bladder pump intake The intent is to improve the chances of collecting the full suite of groundwater quality samples from these two piezometers

In accordance with the conditionally approved GWMP, if the final turbidity reading exceeded 10 nephelometric turbidity units (NTUs), dissolved metal samples were collected from the piezometer or monitoring well During the 2001 interim monitoring activities, turbidity readings in the final stabilized groundwater exceeded the 10-NTU value in piezometers P-23-WC, P-25-US, P-26-US, and P-28-US Therefore, dissolved metal samples were collected from

these four piezometers in accordance with the GWMP The dissolved metal samples were filtered in the field using disposable 0 45-micron filters while the total metal samples were collected unfiltered The collected unfiltered (i e , total) and filtered (i e , dissolved) metal samples were analyzed by the laboratory and the results are reported in this document The dissolved (filtered) metal samples were collected directly from the 0 45-micron filter connected to the bladder pump discharge tubing

During the 2001 interim monitoring activities to satisfy QA/QC protocols in accordance with the GWMP and the companion QAPP one duplicate groundwater quality sample (P-30-GW) was collected from piezometer P-19-WL and one equipment blank (EB-1) sample was collected from a disposable Teflon bladder Sample EB-1 was collected by pouring laboratory grade deionized water through one disposable Teflon bladder In addition four laboratory prepared trip blanks were forwarded to the laboratory and analyzed for VOCs

4.3 Sampling Results

The analytical results for the 2001 interim groundwater monitoring activities are presented in Tables 4-2 4-3 and 4-4 by water-bearing horizon These tables summarize the analytes that were detected above the practical quantitation limit (PQL) of the analytical method or estimated concentrations below the PQL A separate summary table with results for all of the parameters analyzed and the detection limits for each constituent is presented in Appendix A The QA/QC report prepared after reviewing the analytical data is presented in Appendix B The raw analytical data provided by the laboratory are available upon request A discussion of the sampling results for each water-bearing unit is presented in the following sections

4 3 1 Wegee Limestone

The analytical results for the groundwater quality samples collected from the two monitoring wells (MW-3AA-WL and MW-5AA-WL) and one piezometer (P-19-WL) screened in the WL water-bearing horizon are presented in Table 4-2 Groundwater quality sample P-30-GW was a duplicate sample collected from P-19-WL for QA/QC protocols Constituents in the WL water-bearing horizon that exceed MCLs are presented on Figure 4-1

Data collected from the Wegee Limestone formation are summarized as follows

- No VOCs or PAHs were detected above the PQLs of the analytical methods
- B2EHP was detected in two monitoring wells and the duplicate sample However, the reported B2EHP concentrations were qualified as probable blank contamination after QA/QC review
- Estimated iron concentrations in the two monitoring wells (MW-3AA-WL and MW-5AA-WL) piezometer P-19-WL, and the duplicate sample (P-30-GW) exceed the SMCL of 0 3 mg/l (300 μg/l)
- Reported concentrations of manganese in the monitoring wells (MW-3AA-WL and MW-5AA-WL) piezometer P-19-WL and the duplicate sample (P-30-GW) exceed the SMCL of 0 05 mg/l (50 μg/l)
- The low chloride concentrations in the WL monitoring wells and piezometer suggest that these areas may be marginally affected by landfill leachate
- Nitrate and nitrite nitrogen concentrations were reported as not detected in the groundwater quality samples suggesting that this area is not affected by landfill leachate
- The sulfate TDS and turbidity concentrations in the monitoring wells (MW-3AA-WL and MW-5AA-WL) piezometer P-19-WL and the duplicate sample (P-30-GW) exceed their respective SMCLs of 250 mg/l, 500 mg/l, and the proposed turbidity MCL of 1 NTU
- Elevated iron manganese sulfate and TDS concentrations suggest that the WL water-bearing horizon in the former waste pit area may be affected by acid mine drainage (AMD)
- The general absence of organic analytes above PQLs in the WL monitoring wells and piezometer suggest that this area of the BRL site is not affected by organic materials (i e , liquid wastes and sludges) disposed of in the former waste pit area

4 3 2 Waynesburg Coal

The analytical results for the three piezometers installed in the WC horizon (P-23-WC P-24-WC, and P-25-WC) sampled during the 2001 interim groundwater monitoring are presented in Table 4-3 Groundwater sampling results are provided in Table 4-3 Constituents in the WC water-bearing horizon that exceed MCLs are presented on Figure 4-2

Data collected from the Waynesburg Coal formation are summarized as follows

- Estimated concentrations of two VOCs (acetone and 2-Butanone/MEK) were detected above the PQLs in the groundwater quality samples collected from P-23-WC However, the estimated concentration of acetone was qualified as probable blank contamination

- No PAHs were detected in the groundwater quality samples

- B2EHP concentrations were reported in P-23-WC and P-24-WC that exceed the MCL of 6 μg/l The B2EHP concentration in P-23-WC was qualified as estimated and the B2EHP concentrations in P-23-WC and P-24-WC were qualified as probable blank contamination after completion of the QA/QC review

- Estimated concentrations of iron in P-24-WC and P-25-WC and the reported iron concentration in P-23-WC exceed the SMCL of 300 μg/l

- Manganese concentrations in P-23-WC and P-25-WC exceed the SMCL of 50 μg/l

- Dissolved iron and manganese concentrations in P-23-WC and P-25-WC exceed their respective SMCLs

- The estimated dissolved thallium concentration in P-23-WC exceeds the MCL of 2 μg/l

- Total acidity, cyanide (amenable free, and total), and total phosphorous were not detected in the groundwater quality samples

- TDS and turbidity concentrations in all three piezometers exceed their respective SMCL (500 mg/l) and MCL (1 NTU)

- Nitrate and nitrite nitrogen concentrations were reported as not detected in the groundwater quality samples collected from two piezometers (P-23-WC and P-25-WC) and at a level of 0 11 mg/l in P-24-WC, suggesting that this area is not affected by landfill leachate

- The low chloride concentrations in the three WC piezometers suggest that this area may be marginally affected by landfill leachate

- The reported sulfate concentration in the P-25-WC groundwater quality sample exceeds the SMCL of 250 mg/l

- The absence of organic analytes above PQLs suggests that this water-bearing horizon of the BRL site is not affected by organic materials disposed of in the former waste pit area

- The reported sulfate, TDS, iron, and manganese concentrations suggest that this water-bearing horizon, in the vicinity of the former waste pit area, may be marginally affected by AMD

4 3 3 Uniontown Sandstone

The analytical results for the three piezometers installed in the US (P-26-US, P-27-US, and P-28-US) the 2001 interim groundwater monitoring activities are presented in Table 4-4 Constituents that exceed MCLs detected in the US water quality samples are presented on Figure 4-3

Data collected from the Uniontown Sandstone formation are summarized as follows

- Three VOCs (acetone benzene and toluene) were detected above the PQLs The toluene concentrations were reported as estimated and the acetone concentration as probable blank contamination after QA/QC review

- The reported benzene concentrations in two piezometers (P-26-US and P-27-US) exceed the MCL of 5 μg/l

- No PAHs were detected above the PQLs of the analytical methods

- B2EHP was detected in the water quality samples collected from two piezometers (P-27-US and P-28-US) The reported estimated concentration in P-27-US was qualified as probable blank contamination and the 94 μg/l concentration reported in P-28-US resulted from a secondary dilution

- B2EHP concentrations reported in the P-27-US and P-28-US water quality samples exceed the MCL of 6 μg/l

- The reported concentrations of total arsenic (68 4 μg/l) and dissolved arsenic (62 1 μg/l) in piezometer P-26-US exceed the MCL of 50 μg/l

- Concentrations of total and dissolved iron and manganese in water quality samples collected from P-26-US and P-28-US exceed their SMCLs

- TDS concentrations in piezometers P-26-US and P-28-US exceed their SMCLs

- The reported sulfate concentration in P-28-US exceeds the SMCL of 250 mg/l
- Iron and manganese concentrations in two US piezometers (P 26-US and P-28-US) exceed SMCLs
- Turbidity values exceed the MCL in the groundwater quality samples collected from two piezometers (P-26-US and P-28-US)
- Groundwater in the US horizon in the vicinity of the former waste pit area, may be impacted by concentrations of VOCs, B2EHP, arsenic iron manganese sulfate and TDS
- Elevated iron manganese sulfate, and TDS concentrations suggest that the US piezometers are influenced by AMD
- The low chloride concentrations in the three piezometers suggest that these areas may be marginally affected by landfill leachate
- Alkalinity concentrations and pH values in the water quality samples collected from the three piezometers suggest that the groundwater in the US is buffered by carbonate bedrock
- The presence of trace concentrations of three VOCs above PQLs, suggests that the US water-bearing horizon may be marginally affected by organic materials disposed of in the former waste pit. However it is pointed out that these three VOCs were generally absent in groundwater in the two formations stratigraphically above the US (the WL and WC)

4 4 Quality Assurance/Quality Control

4 4 1 Chemical Analyses and Quality Assurance Protocols

Chemical analyses of groundwater samples collected during the July-August 2001 interim groundwater monitoring were performed using EPA-approved methods and protocols included in SW-846 (3rd Edition) or MCAWW The groundwater quality samples were collected and analyzed in accordance with the QAPP prepared by ESC and submitted to EPA on July 26 2001, as a companion document to the GWMP The QAPP is currently undergoing EPA review while the GWMP has been conditionally approved by the EPA

Ten percent of the samples collected during the field activities for laboratory analyses were duplicated. During the 2001 interim groundwater monitoring sampling event one duplicate

groundwater quality sample (P-30-GW) was collected from piezometer P-19-WL Water quality sample P-30-GW was submitted blind to the laboratory Internal laboratory duplicates were also analyzed at the rate of 1 per every 10 samples submitted for analysis

The accuracy of analytical techniques and instrument calibration was monitored through the use of calibration standards Quality control (QC) checks, including the analysis of one field blank (i e equipment blank) and a trip blank, provided with each batch of sample containers to the laboratory, were used to ascertain the integrity of the analyses Acetone was detected in a trip blank and the corresponding sample results were qualified as probable blank contamination in the data tables Acetone B2EHP, barium beryllium iron zinc, and ammonia nitrogen were detected in the equipment blank and the corresponding sample results qualified as probable blank contamination if the reported sample concentration was no more than 5 to 10 times the blank concentration Acetone is a common laboratory contaminant and B2EHP is a plasticizer used in plastics and latex gloves and is ubiquitous in the environment These qualifications did not affect the overall quality or assessment of the analytical data.

Sample matrices were examined to evaluate their effect on the analytical protocol One laboratory prepared matrix spike/matrix spike duplicate (MS/MSD) sample was analyzed in conjunction with the 2001 interim groundwater monitoring The MS/MSD sample was analyzed for SW-846 parameters Matrix spike recoveries and inductively coupled plasma serial dilutions were outside QC limits for iron, sodium, and barium This resulted in qualifying the appropriate metals results as estimated or probable blank concentrations in the data tables However, these qualifications did not affect the overall quality or assessment of the analytical data

Laboratory QC reference samples were integrated into the analytical scheme to assess accuracy All field and laboratory QC samples were analyzed according to the method protocols as regular samples, including all spikes, dilutions, and processing All QC samples were evaluated based on CLP or other EPA accepted criteria of the relevant analytical level

4 4 2 Data Validation

All samples obtained and analyzed were subjected to data validation using the QA/QC criteria specified in the EPA Region V guidance documents and the prepared QAPP for data validation or the specific analytical method Data validation was accomplished by STL-

Pittsburgh's Quality Assurance (QA) Officer and the QA Officer of ESC All laboratory data were validated by ESC s QA Officer using original laboratory reports STL-Pittsburgh produced data reports that allowed for validation by including all QA/QC deliverables for the relevant analytical method Appropriate equations for precision accuracy (bias), and completeness were used for all analyses The data reporting packages were reviewed thoroughly by ESC s QA Officer

The data validation process involved a review of instrument calibration procedures instrument tuning and performance, holding times blanks MS/MSD interference in analytical determinations compound identification system performance verifying calculations and data assessment Criteria for accepting and rejecting data were based on EPA s Functional Guidelines for the Evaluation of Organic and Inorganic Analysis (EPA, 1988) or the QA/QC criteria for the relevant analytical method

A preliminary review was performed by ESC to verify that all necessary paperwork (i e chain of custody's traffic reports, analytical reports laboratory personnel signatures) and deliverables were present A detailed QA review was performed by ESC to verify the qualitative and quantitative reliability of the data as they were presented. This review included a detailed review and interpretation of all data generated by STL-Pittsburgh

Based on the review of the analytical data, an organic and inorganic QA report was prepared and is provided in Appendix B The report consists of a general introduction section, followed by qualifying statements that were taken into consideration for the analytical results used in the data tables Based on the QA review qualifier codes were placed next to specific sample results on the sample data tables These qualifier codes serve as an indication of the qualitative and quantitative reliability of the data A glossary of data qualifiers is also included

Based on the QA/QC review specifically detected VOCs, B2EHP, metals, and other inorganic analytes were qualified as probable blank contamination or estimated concentrations The analytical data, as qualified, are of acceptable quality and are usable for the purpose of assessing constituent concentrations in groundwater at the BRL site

5 0 Conclusions

This section summarizes the key results of the 2001 interim groundwater monitoring completed during July and August 2001 in the vicinity of the former waste pit area, at the BRL site

5 1 Groundwater Flow Directions

One goal of the 2001 interim groundwater monitoring was to measure water levels in the WL, WC, and US water-bearing horizons for determining and evaluating groundwater flow directions Groundwater elevations were measured in two monitoring wells and a piezometer installed in the WL, three piezometers completed in the WC and three piezometers installed in the US Based on the groundwater elevation data collected on August 6, 2001 potentiometric surface maps for the WL WC and US were constructed

Based on the August 2001 water levels groundwater in the WL, in the former waste pit area, flows to the northeast and would be captured by surface water diversions and underdrains installed during performance of the Phase I RA activities

Groundwater flow in the WC is toward the north-northwest based on the August 2001 data from the three piezometers Based on the August 2001 water levels in the three US piezometers, groundwater flow is to the west

5 2 Groundwater Quality of the Wegee Limestone

Groundwater quality samples were collected from two monitoring wells and a piezometer completed in the WL horizon in the former waste pit area Based on the analytical data, no VOCs or PAHs were detected in the water quality samples above PQLs of the analytical methods B2EHP was detected above its MCL of 6 μg/l, however these B2EHP concentrations were qualified after QA/QC review as probable blank contamination B2EHP is a common laboratory contaminant and is ubiquitous to the environment

Manganese and sulfate concentrations, and estimated concentrations of iron in the monitoring wells and piezometer exceed applicable SMCLs The reported concentrations of TDS and turbidity exceed applicable SMCLs Low chloride concentrations suggest that the WL

horizon in the former waste pit area may be marginally affected by landfill leachate Elevated iron, sulfate manganese, and TDS concentrations indicate that groundwater in the WL may be affected by AMD The general absence of organic analytes above PQLs suggests that organic materials disposed of in the former waste pit area are not migrating into the WL horizon from the former waste pit area

5.3 Groundwater Quality of the Waynesburg Coal

Groundwater quality samples were collected from three piezometers installed in the WC horizon in the former waste pit area. Based on the analytical data, no PAHs were detected in the water quality samples above the PQLs of the analytical method Estimated concentrations of acetone and 2-butanone were detected above PQLs in piezometer P-23-WC The reported acetone concentration was further qualified after the QA/QC review as attributed to blank contamination B2EHP concentrations were reported in P-23-WC and P-24-WC that exceed the applicable MCL However the B2EHP concentration in both water quality samples were qualified as attributed to blank contamination and the concentration in P-23-WC was further qualified as an estimated concentration B2EHP is a common laboratory contaminant and is ubiquitous to the environment

Total and estimated iron concentrations reported in the groundwater quality samples collected from the three piezometers exceed the applicable SMCL Manganese concentrations in P-23-WC and P-25-WC were reported above the SMCL The dissolved thallium concentration in the groundwater sample collected from P 23 WC exceeded the applicable MCL of 6 μg/l However, the reported dissolved thallium concentration was qualified as an estimated concentration after completion of the QA/QC review Concentrations of dissolved iron and dissolved manganese in P-23-WC and P-25-WC exceed applicable SMCLs TDS and turbidity concentrations in all three piezometers and sulfate concentrations in P-28-US exceed applicable SMCLs The low chloride concentrations suggest that this water-bearing horizon is only marginally affected by landfill leachate Elevated iron, sulfate, manganese, and TDS concentrations suggest that this water-bearing horizon may be marginally affected by AMD The general absence of organic analytes above PQLs suggests that organic materials disposed of in

the former waste pit area are not migrating through the WC aquifer in the vicinity of the former waste pit area of the BRL site

5 4 Groundwater Quality of the Uniontown Sandstone

Three groundwater quality samples were collected from three piezometers installed in the US water-bearing horizon in the former waste pit area No PAHs were detected in the analyzed groundwater quality samples Acetone was detected above its PQL in P-27-US and was attributed to blank contamination Estimated concentrations of toluene were reported in groundwater quality samples collected from piezometers P-26-US and P-27-US Benzene concentrations that exceed the applicable MCL were reported in P-26-US and P-27-US Estimated and diluted B2EHP concentrations were detected in two of the water quality samples (P-27-US and P-28-US) at concentrations above its MCL The B2EHP in P-27-US was qualified as attributed to blank contamination and the concentration in P-28-US was reported from a diluted sample due to matrix interference However B2EHP is a common laboratory contaminant and is ubiquitous to the environment

Total and dissolved arsenic concentrations reported in P-26-US exceed the applicable MCL Total and dissolved iron and manganese concentrations in piezometers P-26-US and P-28-US exceed their applicable SMCLs TDS and turbidity concentrations in P-26-US and P-28-US, and sulfate concentrations in P-28-US exceed applicable SMCLs and MCLs Groundwater quality samples for total and dissolved metals BOD COD ammonia nitrogen, TDS, TSS, and turbidity were not collected from piezometer P-27-US due to insufficient water column

Low chloride concentrations in the US piezometers in the former waste pit area suggest that the groundwater may be marginally affected by landfill leachate Elevated concentrations of iron sulfate, manganese, and TDS suggest that the US horizon may be affected by acid mine drainage Organic analytes were generally absent, but the low reported concentrations of three VOCs could suggest that organic materials disposed of in the former waste pit area may be marginally affecting the US in the vicinity of the former waste pit area It is pointed out however, that these three VOCs were generally absent in the WL and the WC water-bearing horizons

6 0 References

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Tables

Table 1 1

Groundwater Monitoring Program
Monitoring Parameter List
Buckeye Reclamation Landfill
Belmont County, Ohio

Acetone
Acrylonitrile
Benzene
Bromocholoromethane
Bromodichloromethane
Bromoform Tribromomethane
Carbon disulfide
Carbon tetrachloride
Chlorobenzene
Chloroethane Ethyl chloride
Chloroform, Trichloromethane
Dibromochloromethane Chlorodibromomethane
1 2-Dibromo-3-chloropropane DBCP
1 2-Dibromomethane Ethylene dibromide EDB
o Dichlorobenzene 1,2-Dichlorobenzene
p Dichlorobenzene 1 4-Dichlorobenzene
trans 1 4-Dichloro 2 butene
1 1 Dichloroethane Ethylidene chloride
1 2 Dichlorothane Ethylidene dichloride
1 1 Dichloroethylene 1 1-Dichloroethene Vinylidene chloride
cis-1 2-Dichlorothylene cis 1 2-Dichloroethene
trans-1 2-Dichlorothylene trans-1 2-Dichloroethene
1 2 Dichloropropane Propylene dichloride
cis-1 3 Dichloropropene
trans-1 3 Dichloropropene
Ethylbenzene
2 Hexanone Methyl butyl ketone
Methyl bromide Bromomethane
Methyl chloride Chloromethane
Methylene bromide Dibromomethane
Methylene chloride Dichloromethane
Methyl ethyl ketone MEK 2-Butanone
Methyl iodide iodomethane
4-Methyl-2-pentanone Methyl isobutyl ketone
Styrene
1 1 1 2 Tetrachloroethane
1 1 2 2 Tetrachloroethane
Tetrachlorethylene Tetrachlorethene Perchloroethylene
Toluene
1 1 1 Trichloroethane Methylchloroform
1 1 2 Trichloroethane
Trichloroethylene Trichloroethene
Trichloroflouromethane CFC-11
1 2 3 Trichloropropane
Vinyl acetate
Vinyl chloride
Xylenes
Anthracene
Benzo(a)anthracene
Benzo(k)fluoranthene
3 4-Benzofluoranthene Benzo(b)fluoranthene
Benzo(g h I)perylene
Benzo(a)pyrene
Chrysene
Dibenzo(a h)anthracene
Fluorine
Indeno(1 2 3-c d)pyrene
Naphthalene
Phenanthrene
Pyrene
Bis(2-ethylhexyl)phthalate
Antimony
Arsenic
Barium
Beryllium
Cadmium
Chromium
Cobalt
Copper
Lead
Nickel
Selenium
Silver
Thallium
Vanadium
Zinc
Sodium
Magnesium
Calcium
Potassium
Iron
Manganese
Cyanide (total reactive and amenable)
Ammonia
Chloride
Chemical oxygen demand (COD)
Temperature (a)
pH (a)
Specific conductance (a)
Total dissolved solids (TDS)
Oxidation/reduction potential (ORP/Eh) (a)
Total phosphorous
Total acidity
Oil and grease
Total alkalinity
Nitrate-nitrite
Sulfate
Turbidity (b)
Dissolved Oxygen (a)
Total Organic Carbon (TOC)
Sulfide
Biological Oxygen Demand (BOD)
Total suspended solids (TSS)

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a/ Parameter analyzed during field sampling event
b/ Parameter analyzed in field and laboratory

Table 2 1

Construction Data for Piezometers and Monitoring Wells
Former Waste Pit Area
Buckeye Reclamation Landfill
Belmont County, Ohio (a)

Piezometer/ Monitoring Well	Surface Elevation (ft AMSL) (b)	Top of PVC Casing Elevation (ft AMSL) (b)	Total Depth (ft) (c)	Monitoring Interval (ft) (d)	Monitoring Interval (ft AMSL) (d)
Wegee Limestone					
MW 3AA WL	1 160 05	1 164 74	97 05	93 05 97 05	1 067 69-1 062 69
MW 5AA WL	1 138 29	1 139 50	71 71	66 71 71 71	1 067 79 1 062 79
P 19 WL	1 121 03	1 125 34	57 71	52 71 57 71	1 067 63 1 062 63
Waynesburg Coal					
P 23 WC	1 140 77	1 144 86	100 20	97 7 100 20	1 044 66-1 042 16
P 24-WC	1 127 95	1 131.52	86 23	84 23 86 23	1 047 29 1 045 29
P 25 WC	1 112 54	1 114 62	69 32	66 82 69 32	1 047 80-1 045 30
Uniontown Sandstone					
P 26-US	1 142 88	1 146 49	137 87	123 87 137 87	1 019 62 1008 62
P 27 US	1 129 45	1 131 68	122 64	109 64-122 64	1 022 04-1 009 04
P 28-US	1 112 61	1 114 72	100 87	84 87 100 87	1 029 85 1 013 85

a/ All piezometers and monitoring wells are 2 inches inside diameter AMSL = Above mean sea level
b/ RA Phase I contractor August 2001 re surveyed elevation
c/ Measured from top of polyvinyl chloride (PVC) casing
d/ Calculated based on current total depth and installed screen length

Table 3-1

Potentiometric Surface Elevations for Piezometers and Monitoring Wells
Buckeye Reclamation Landfill
Belmont County, Ohio
August 6, 2001 (a)

Monitoring Well/ Piezometer	Top of PVC Casing Elevation	Depth to Water (ft) (b)	Water Table Elevation	Water Table Elevation June 22, 1998
Wegee Limestone				
MW-3AA WL	1 165 31	84 01	1 081 30	1 081 77
MW 5AA WL	1 139 50	56 50	1 083 00	1 083 24
P 19-WL	1 125 34	45 00	1 080 34	1 081 33
Waynesburg Coal				
P 23 WC	1 144 86	93 76	1 051 10	1 054 13
P 24-WC	1 131 52	80 17	1 051 35	1 053 12
P 25-WC	1 114 62	62 54	1 052 08	1 052 27
Uniontown Sandstone				
P 26 US	1 146 49	130 11	1 016 38	1 011 13
P 27 US	1 131 68	119 58	1 012 10	1 011 50
P 28 US	1 114 72	85 88	1 028 84	1 028 85

a/ All elevations in feet Above Mean Sea Level (AMSL)
b/ Measured from top of PVC casing

docs/Buckeye/144195/GWelevs8-01.xls

Table 4-1

Final Field Measurements
Piezometers and Monitoring Wells
Buckeye Reclamation Landfill
Belmont County, Ohio
July and August 2001 (a)

Monitoring Well/ Piezometer	pH	Specific Conductivity (uS/cm)	Temperature (^{0}C)	DO (mg/l)	ORP/Eh (mv)	Turbidity (NTUs)
Wegee Limestone						
MW 3AA WL	6 36	3 10	15 67	0 92	289	3
MW 5AA WL	7 24	4 04	18 13	1 41	249	5
P 19 WL	6 66	3 05	17 12	1 57	211	6
Waynesburg Coal						
P 23 WC	6 71	2 26	20 34	0 47	282	62
P-24-WC	8 55	1 13	17 36	0 90	146	1
P-25-WC	7 86	3 86	17 85	0 93	202	30
Uniontown Sandstone						
P 26-US	6 43	4 38	18 80	1 55	79	28
P 27 US	8 26	3 31	23 30	0 68	90	24
P 28 US	8 14	4 57	18 25	0 79	168	80

a/ uS/cm=milli Siemens per centimeter °C=degrees Celsius DO=Dissolved oxygen mg/l=milligrams per liter ORP/Eh=Oxidation reduction potential mv=millivolts NTUs=Nephelometric Turbidity Unit.

docs/Buckeye/144195/Fieldmeas-7&8-01.xls

Table 4-2

Groundwater Sampling Results, Wegee Limestone
Buckeye Reclamation Landfill
Belmont County, Ohio
July 17 19, 2001 (a)

	Monitoring Well/Piezometer Number				EPA	OEPA
	MW 3AA WL	MW 5AA WL	P 19-WL	P 30-GW (b)	MCL (c)	MCL (d)
SVOCs (ug/l)						
Bis(2 Ethylhexyl) Phthalate	15 B	5 8 JB	10 U	50 B	6	6
Total Metals (ug/l)						
Arsenic	2 6	3 1	2 0 U	2 0 U	50	50
Barium	46 7 J	22 9 J	19 3 J	18 8 J	2 000	2 000
Beryllium	0 4 J	0 49 J	0 4 J	0 48 J	4	4
Calcium	354 000	101 000	432 000	437 000	NS	NS
Chromium	3 1	2	2 2	2 1	100	100
Cobalt	5 5	2 6 U	4 6	3.2	NS	NS
Copper	1 3 U	4 3	1 3 U	1 3 U	1 000 e	NS
Iron	19 200 J	673 J	462 J	405 J	300 e	300 g
Magnesium	165 000	67 700	170 000	170 000	NS	NS
Manganese	2 150	95 9	1 500	1 510	50 e	50 g
Nickel	11 5	7 9 U	7 9 U	7 9 U	NS	100
Potassium	8 05	10 200	4 570	4 550	NS	NS
Sodium	259 000	731 000	90 100	89 600	NS	NS
Vanadium	5 0	4 1 U	5 4	5 5	NS	NS
Zinc	4 8 J	4 2 J	4.3 J	3.2 U	5 000 e	5 000 g
General Chemistry Parameters (mg/l)						
Total Alkalinity	675	553	718	720	NS	NS
Total Organic Carbon (TOC)	7 1	4 0	7 1	8.3	NS	NS
Chloride	95 6	79 2	118	120	250 e	250 g
Biochemical Oxygen Demand (BOD)	4 7	2 U	2 4	2 4	NS	NS
Chemical Oxygen Demand (COD)	24 2	10 U	26 4	28 6	NS	NS
Ammonia Nitrogen	1.5	0 73	0 18 B	0 19 B	NS	NS
Total Dissolved Solids (TDS)	3 010	2 820	2 630	2,550	500 e	500 g
Total Suspended Solids (TSS)	35 2	10 4	9 6	6 0	NS	NS
Sulfate	1 410	1,500	1 130	1 070	250 e	250 g
Turbidity (NTUs)	46	8 7	1 7	2	1 f	NS

a/ U=Undetected at the practical quantitation limit J=Estimated concentration B=Probable blank contamination NS=No standard, VOCs=Volatile organic compounds SVOC=Semi volatile organic compounds ug/l=Micrograms per liter mg/l=Milligrams per liter NTUs=Nephelometric turbidity units

b/ Duplicate sample of P 19 WL

c/ Environmental Protection Agency March 2001 National Primary Drinking Water Standards Maximum Contaminant Level (MCL)

d/ Ohio EPA MCL

e/ EPA National Secondary Maximum Contaminant Level (SMCL)

f/ EPA MCL effective January 1 2002

g/ Ohio EPA SMCL

Table 4-3

Groundwater Sampling Results, Waynesburg Coal
Buckeye Reclamation Landfill
Belmont County Ohio
July 17 19 and August 7 2001 (a)

	Piezometer Number			EPA	OEPA
VOCs (ug/l)	P 23-WC	P 24-WC	P 25-WC	MCL (b)	MCL (c)
Acetone	11 JB	20 U	20 U	NS	NS
2 Butanone (MEK)	12 J	20 U	20 U	NS	NS
SVOCs (ug/l)					
Bis(2 Ethylhexyl) Phthalate	7 7 JB	14 B	10 U	6	6
Total Metals (ug/l)					
Arsenic	16 2	3 7	2 0 U	50	50
Barium	149 J	53 6 J	51 8 J	2 000	2 000
Beryllium	0 15 J	0 41 J	0.52 J	4	4
Cadmium	0 63 U	0 63 U	1 6	5	5
Calcium	9 770	10 600	467 000	NS	NS
Chromium	1 9 J	3 1	2 4	100	100
Copper	1 8 U	3 1	19 7	1 000 d	NS
Iron	4 220	336 J	1 440 J	300 d	300 f
Magnesium	722 J	3 630	207 000	NS	NS
Manganese	354	26 5	3,510	50 d	50 f
Potassium	59 100	2 480	31 800	NS	NS
Sodium	394 000	276 000	224 000	NS	NS
Vanadium	4 1 U	4 1 U	5 1	NS	NS
Zinc	11 4 J	12 4 J	3 2 U	5 000 d	5 000 f
Dissolved Metals (ug/l)					
Arsenic	15 0	NA	2 0 U	50	50
Barium	133 J	NA	25 1	2 000	2 000
Beryllium	0 20 J	NA	0 45	4	4
Calcium	8 820	NA	442 000	NS	NS
Chromium	1 1 U	NA	1 9	100	100
Copper	3 0 J	NA	1 3 U	1 000 d	NS
Iron	2 040	NA	1 150	300 d	300 f
Magnesium	662 J	NA	203 000	NS	NS
Manganese	320	NA	3 320	50 d	50 f
Potassium	55 700	NA	28 000	NS	NS
Sodium	388 000	NA	217 000	NS	NS
Thallium	6 9 J	NA	5 7 U	2	2
Zinc	4 8 J	NA	3 2 U	5 000 d	5 000 f
General Chemistry Parameters (mg/l)					
Total Alkalinity	878	501	1 070	NS	NS
Total Organic Carbon (TOC)	27 1	4 5	8 2	NS	NS
Chloride	77 1	103	66 4	250 d	250 f
Biochemical Oxygen Demand (BOD)	80 9	66 9	6 9	NS	NS
Chemical Oxygen Demand (COD)	143	69 9	14 3	NS	NS
Nitrate Nitrite	0 10 U	0 11	0 10 U	10	10 f
Ammonia Nitrogen	0 98	0 49 B	1 9	NS	NS
Oil and Grease	5 2	5 U	5 U	NS	NS
Total Dissolved Solids (TDS)	1 160	905	3 300	500 d	500 f
Total Suspended Solids (TSS)	20 4	4 U	38 4	NS	NS
Sulfate	10 G	50 1	1,560	250 d	250 f
Total Sulfide	1 U	14 8	1 U	NS	NS
Turbidity (NTUs)	1 080	241	37 4	1 e	NS

a/ U=Undetected at the practical quantitation limit; J=Estimated concentration NA=Not analyzed, B=Probable blank contamination NS=No standard VOCs=Volatile organic compounds SVOC=Semi volatile organic compounds ug/l=Micrograms per liter mg/l=Milligrams per liter NTUs=Nephelometric turbidity units G=elevated detection limit due to matrix interference

b/ Environmental Protection Agency March 2001 National Primary Drinking Water Standards Maximum Contaminant Level (MCL)

c/ Ohio EPA MCL

d/ EPA National Secondary Maximum Contaminant Level (SMCL)

e/ EPA MCL effective January 1 2002

f/ Ohio EPA SMCL

Table 4-4

Groundwater Sampling Results, Uniontown Sandstone
Buckeye Reclamation Landfill
Belmont County Ohio
July 17 19 and August 7 2001 (a)

	Piezometer Number			EPA	OEPA
VOCs (ug/l)	P 26-US	P 27 US(c)	P 28-US	MCL (c)	MCL (d)
Acetone	20 U	25 B	20 U	NS	NS
Benzene	5 3	18	5 U	5	5
Toluene	1 3 J	1 3 J	5 U	1 000	1 000
SVOCs (ug/l)					
Bis(2 Ethylhexyl) Phthalate	10 U	6 6 JB	94 D	6	6
Total Metals (ug/l)					
Arsenic	68 4	(b)	7 5	50	50
Barium	744	(b)	23 2 J	2 000	2,000
Beryllium	0 16 J	(b)	0 57 J	4	4
Calcium	16 300	(b)	51 200	NS	NS
Chromium	1.5 J	(b)	4 2	100	100
Cobalt	8 9 J	(b)	2 6 U	NS	NS
Copper	3 7 J	(b)	2 5	1 000 e	NS
Iron	16 900	(b)	1 860 J	300 e	300 g
Lead	2 2 J	(b)	1 8 U	15	NS
Magnesium	4,470	(b)	22 000	NS	NS
Manganese	389	(b)	212	50 e	50 g
Nickel	8 7 J	(b)	7 9 U	NS	100
Potassium	2 980	(b)	4 200	NS	NS
Sodium	1 180 000	(b)	1 100 000	NS	NS
Zinc	8 4 J	(b)	3 2 U	5 000 e	5 000 g
Dissolved Metals (ug/l)					
Arsenic	62.1	(b)	6 4	50	50
Barium	585	(b)	19 8	2,000	2,000
Beryllium	0 23 J	(b)	0 40	4	4
Calcium	14 800	(b)	45 200	NS	NS
Chromium	1 1 U	(b)	1 4	100	100
Cobalt	4 3 J	(b)	2 6 U	NS	NS
Copper	5 2 J	(b)	1 6	1 000 e	NS
Iron	8 120	(b)	1 840	300 e	300 g
Magnesium	4 280 J	(b)	19 700	NS	NS
Manganese	303	(b)	215	50 e	50 g
Nickel	15 9 J	(b)	7 9 U	NS	100
Potassium	3 280 J	(b)	3 660	NS	NS
Silver	1 0 J	(b)	0 75 U	100 e	100 g
Sodium	1 130 000	(b)	1 050 000	NS	NS
Zinc	6 9 J	(b)	3 2 U	5 000 e	5 000 g
General Chemistry Parameters (mg/l)					
Total Alkalinity	2,660	2,020	1 060	NS	NS
Total Organic Carbon (TOC)	78 1	35 6	5 6	NS	NS
Chloride	48 0	99 3	65 2	250 e	250 g
Biochemical Oxygen Demand (BOD)	80 2	(b)	8 6	NS	NS
Chemical Oxygen Demand (COD)	242	(b)	10 U	NS	NS
Ammonia Nitrogen	0 96	(b)	1 5	NS	NS
Oil and Grease	11 5	5 U	5 U	NS	NS
Total Dissolved Solids (TDS)	3 210	(b)	3 200	500 e	500 g
Total Suspended Solids (TSS)	29 0	(b)	17 2	NS	NS
Sulfate	10 G	5 U	1 450	250 e	250 g
Total Phosphorus	0 22	(b)	0 10 U	NS	NS
Turbidity (NTUs)	102	(b)	23 4	1 f	NS

a/ U=Undetected at the practical quantitation limit, J=Estimated concentration, NA=Not analyzed B=Probable blank contamination
NS=Not sampled during monitoring event VOCs=Volatile organic compounds SVOCs=Semi volatile organic compounds
ug/l=Micrograms per liter mg/l=Milligrams per liter NTUs=Nephelometric turbidity units
G=elevated detection limit due to matrix interference.

b/ Specific parameters not analyzed due to insufficient water column.

c/ Environmental Protection Agency March 2001 National Primary Drinking Water Standards Maximum Contaminant Level (MCL)

d/ Ohio EPA MCL.

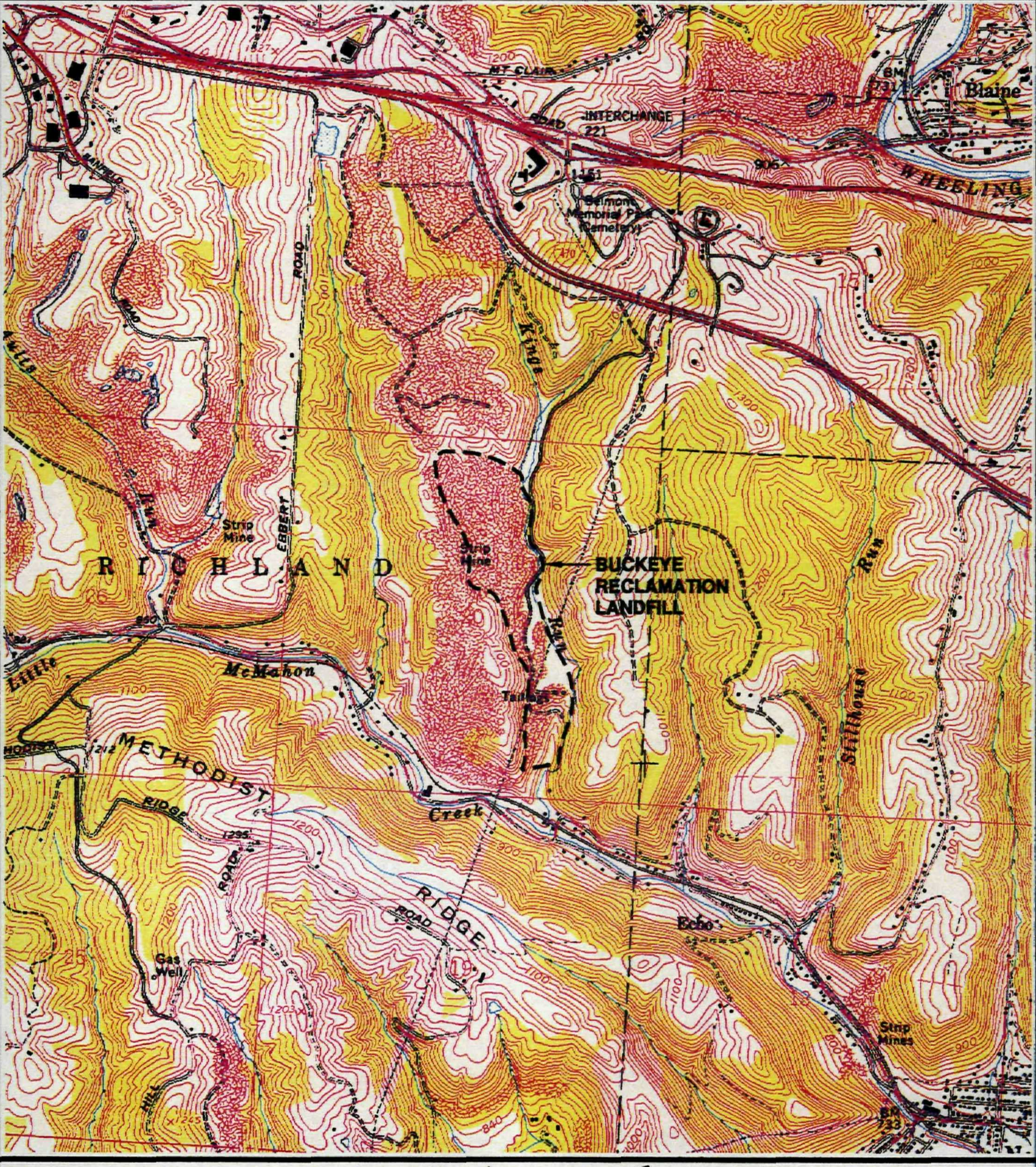
e/ EPA National Secondary Maximum Contaminant Level (SMCL)

f/ EPA MCL effective January 1 2002

g/ Ohio EPA SMCL

Figures

Dwg Name: 144195-A02



REFERENCE:

USGS 7.5 MINUTE TOPOGRAPHIC QUADRANGLE, LANSING, OHIO, DATED 1960, REVISED 1992. SCALE 1:24000.

QUADRANGLE LOCATION

SCALE, FEET

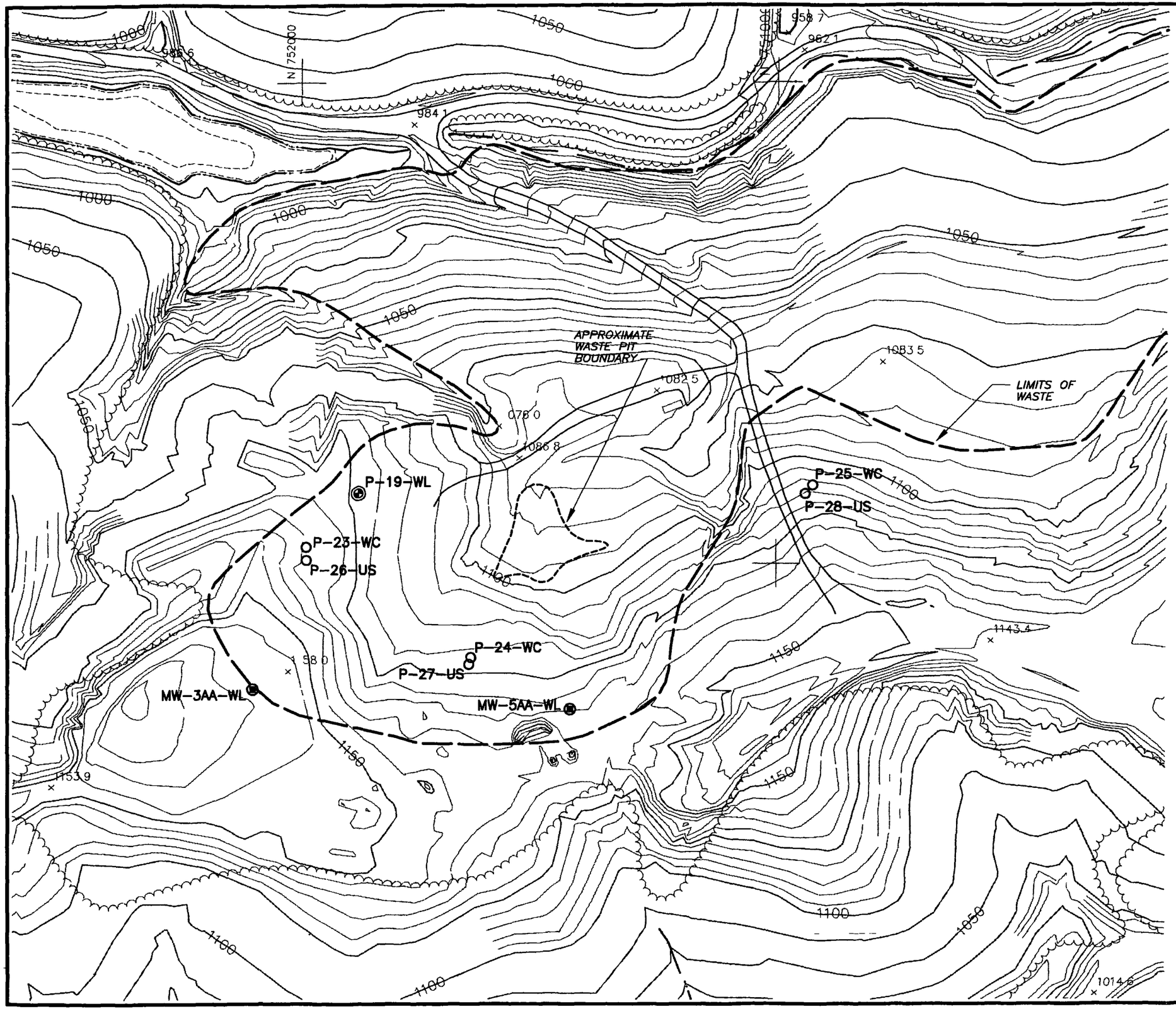
0 2000 4000

ENVIRONMENTAL STRATEGIES CORPORATION
ESC
Four Penn Center West, Suite 315
Pittsburgh, Pennsylvania 15276
(412) 787-5100

Figure 1-1

SITE LOCATION MAP

BUCKEYE RECLAMATION LANDFILL SITE
BELMONT COUNTY, OHIO
PREPARED FOR
BUCKEYE RECLAMATION LANDFILL SETTLING DEFENDANTS
PITTSBURGH, PENNSYLVANIA



LEGEND

P-19-WL ◉ PIEZOMETER (INSTALLED AS PART OF PRE-DESIGN 1992)

MW-3AA-WL ◉ MONITORING WELL (INSTALLED AS PART OF RI/FS 1987)

P-23-WC P-23-US ○ PIEZOMETER (INSTALLED AS PART OF WASTE PIT AREA INVESTIGATION 1997)

REFERENCE

AERIAL MAPPING PREPARED BY EASTERN MAPPING CO DATE. MAY 12 1992 SCALE 1 =200

SCALE FEET

0 100 200 400

Drawn by raz 100801
Checked
Approved
DWG Number 144195-B33

BUCKEYE RECLAMATION LANDFILL SITE
BELMONT COUNTY OHIO
PREPARED FOR
BUCKEYE RECLAMATION LANDFILL SETTLING DEFENDANTS
PITTSBURGH PENNSYLVANIA

Figure 2-1

LOCATIONS OF PIEZOMETERS AND MONITORING WELLS

ENVIRONMENTAL STRATEGIES CORPORATION
Four Penn Center West Suite 315
Pittsburgh Pennsylvania 15276
(412) 787-5100
ESC

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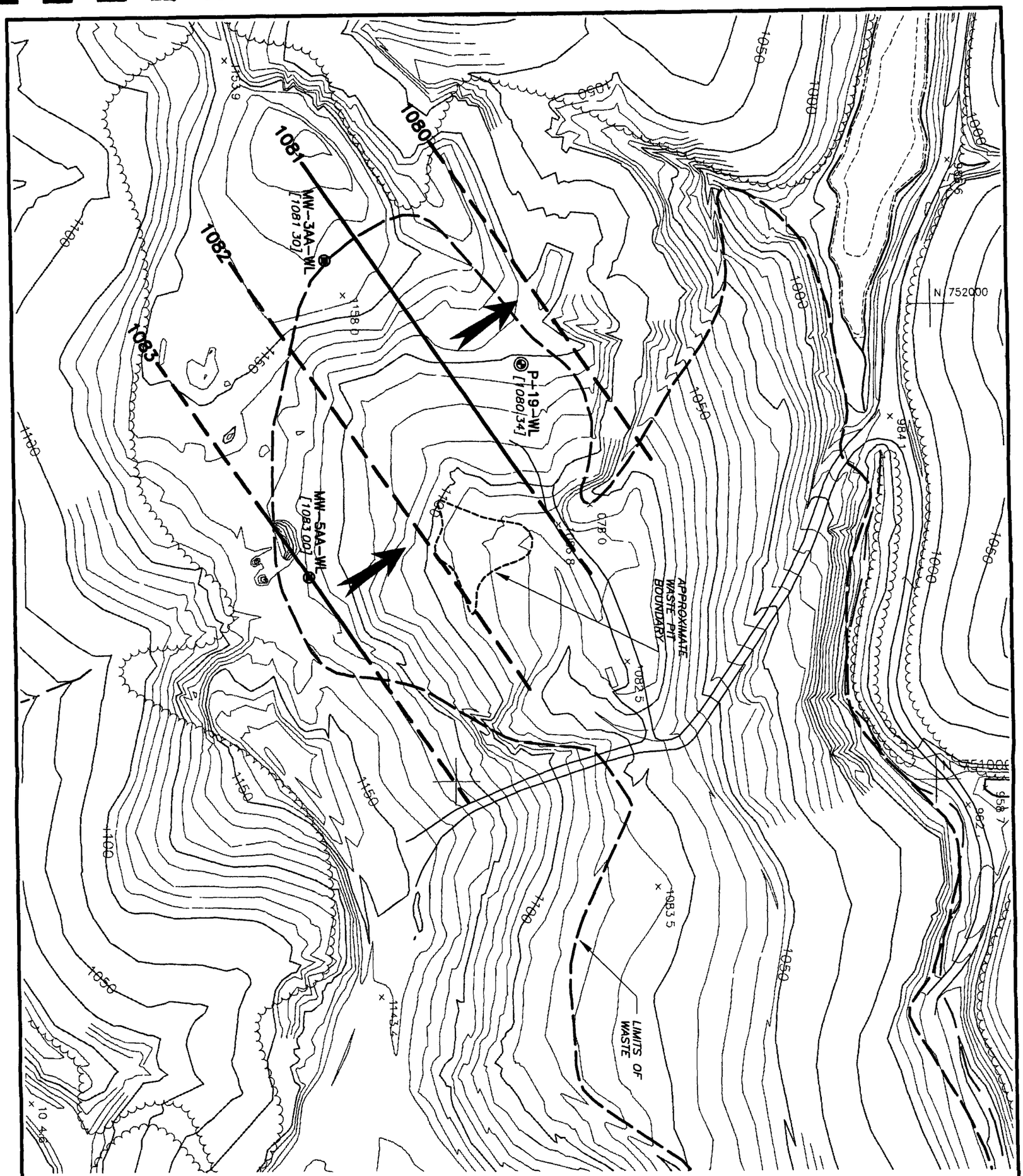


LEGEND

P-19-WL — PIEZOMETER (INSTALLED AS PART OF PRE-DESIGN 1992)

MW-3AA-WL — MONITORING WELL (INSTALLED AS PART OF RI/FS 1987)

[1080.34] — GROUNDWATER ELEVATION (FEET ABOVE MEAN SEA LEVEL)

1082 — GROUNDWATER CONTOUR (DASHED WHERE INFERRED)

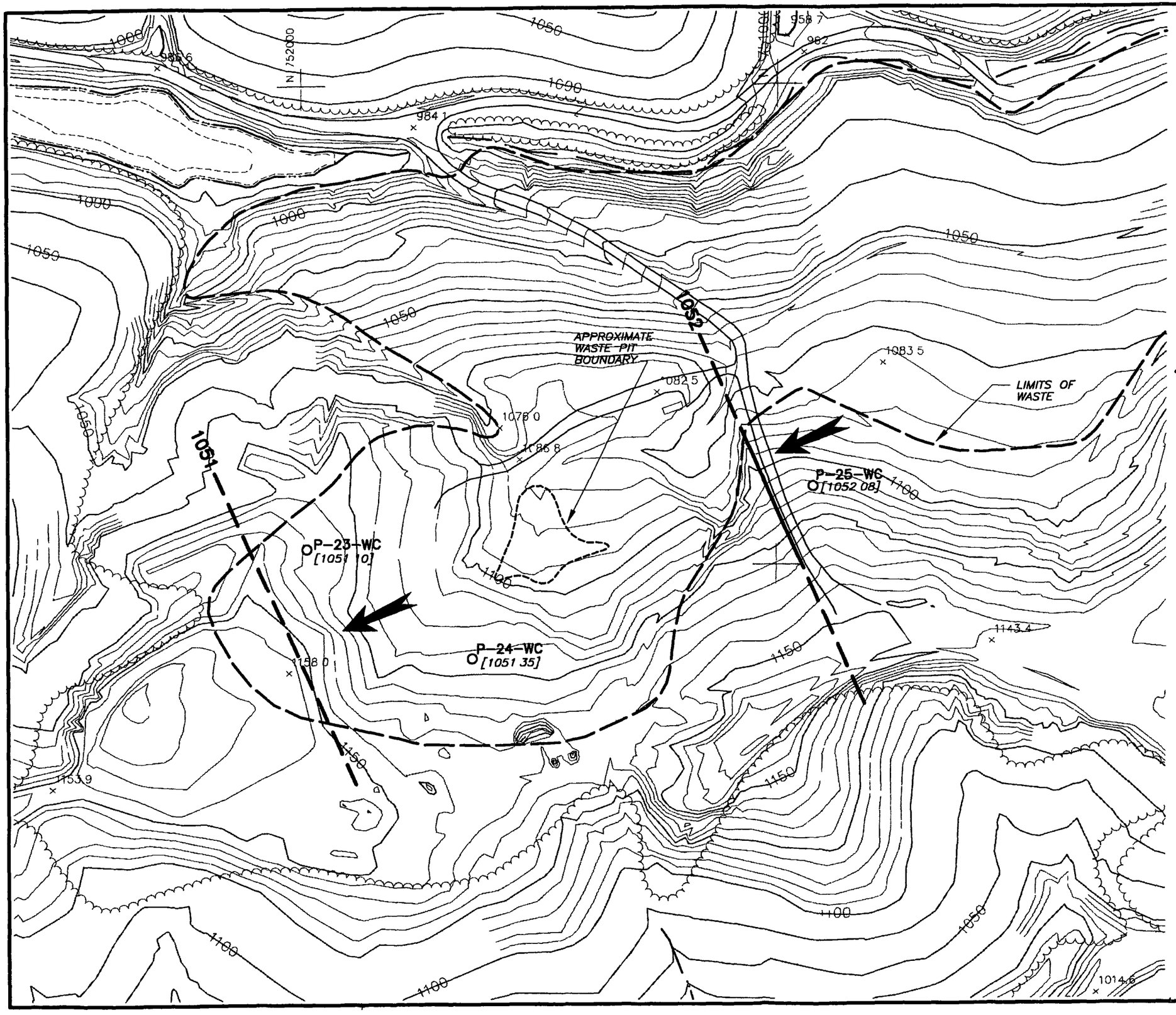
DIRECTION OF GROUNDWATER FLOW

N

SCALE FEET
0 100 200 400

REFERENCE:
AERIAL MAPPING PREPARED BY EASTERN MAPPING CO DATE MAY 12 1992 SCALE 1"=200'

ENVIRONMENTAL STRATEGIES CORPORATION ESC Four Penn Center West, Suite 315 Pittsburgh Pennsylvania 15276 (412) 787-5100	Figure 3-1 POTENTIOMETRIC SURFACE MAP WEGEE LIMESTONE - AUGUST 2001	BUCKEYE RECLAMATION LANDFILL SITE BELMONT COUNTY, OHIO PREPARED FOR BUCKEYE RECLAMATION LANDFILL SETTLING DEFENDANTS PITTSBURGH PENNSYLVANIA	Drawn By: RAZ 100801 Checked: Approved: Dwg Name: 144195-B34



LEGEND

P-23-WC ○ PIEZOMETER (INSTALLED AS PART OF WASTE PIT AREA INVESTIGATION 1997)

[1051 10] GROUNDWATER ELEVATION (FEET ABOVE MEAN SEA LEVEL)

—1052— GROUNDWATER CONTOUR (DASHED WHERE INFERRED)

DIRECTION OF GROUNDWATER FLOW

REFERENCE.
AERIAL MAPPING PREPARED BY EASTERN MAPPING CO DATE MAY 12 1992 SCALE 1 =200

SCALE FEET
0 100 200 400

Drawn By RAZ 100801
Checked:
Approved:
Dwg Name: 144195-B35

BUCKEYE RECLAMATION LANDFILL SITE
BELMONT COUNTY, OHIO
PREPARED FOR
BUCKEYE RECLAMATION LANDFILL SETTLING DEFENDANTS
PITTSBURGH PENNSYLVANIA

Figure 3-2
POTENTIOMETRIC SURFACE MAP
WAYNESBURG COAL – AUGUST 2001

ENVIRONMENTAL STRATEGIES CORPORATION
Four Penn Center West Suite 315
Pittsburgh Pennsylvania 15276
(412) 787-5100
ESC

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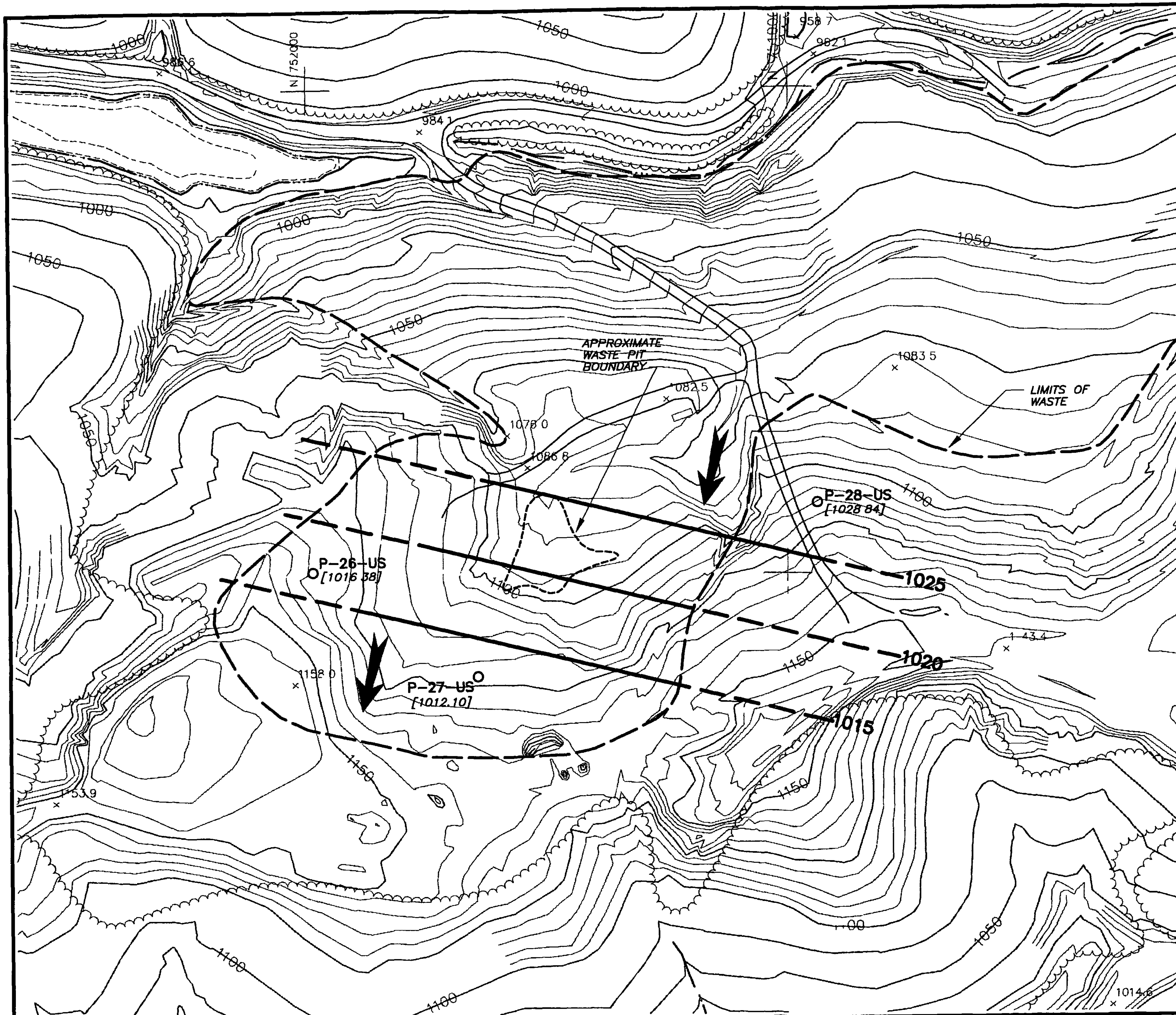

LEGEND

P-26-US ○ PIEZOMETER (INSTALLED AS PART OF WASTE PIT AREA INVESTIGATION 1997)

[1028 84] GROUNDWATER ELEVATION (FEET ABOVE MEAN SEA LEVEL)

—1020— GROUNDWATER CONTOUR (DASHED WHERE INFERRED)

DIRECTION OF GROUNDWATER FLOW

REFERENCE.
AERIAL MAPPING PREPARED BY EASTERN MAPPING CO DATE. MAY 12 1992 SCALE 1 =200

SCALE FEET
0 100 200 400

BUCKEYE RECLAMATION LANDFILL SITE
BELMONT COUNTY, OHIO
PREPARED FOR
BUCKEYE RECLAMATION LANDFILL SETTLING DEFENDANTS
PITTSBURGH PENNSYLVANIA

Figure 3-3

POTENTIOMETRIC SURFACE MAP
UNIONTOWN SANDSTONE - AUGUST 2001

ENVIRONMENTAL STRATEGIES CORPORATION
Four Penn Center West, Suite 315
Pittsburgh Pennsylvania 15276
(412) 787-5100

Drawn By: RAZ 100801
Checked:
Approved:
Drg Name: 144195-B36

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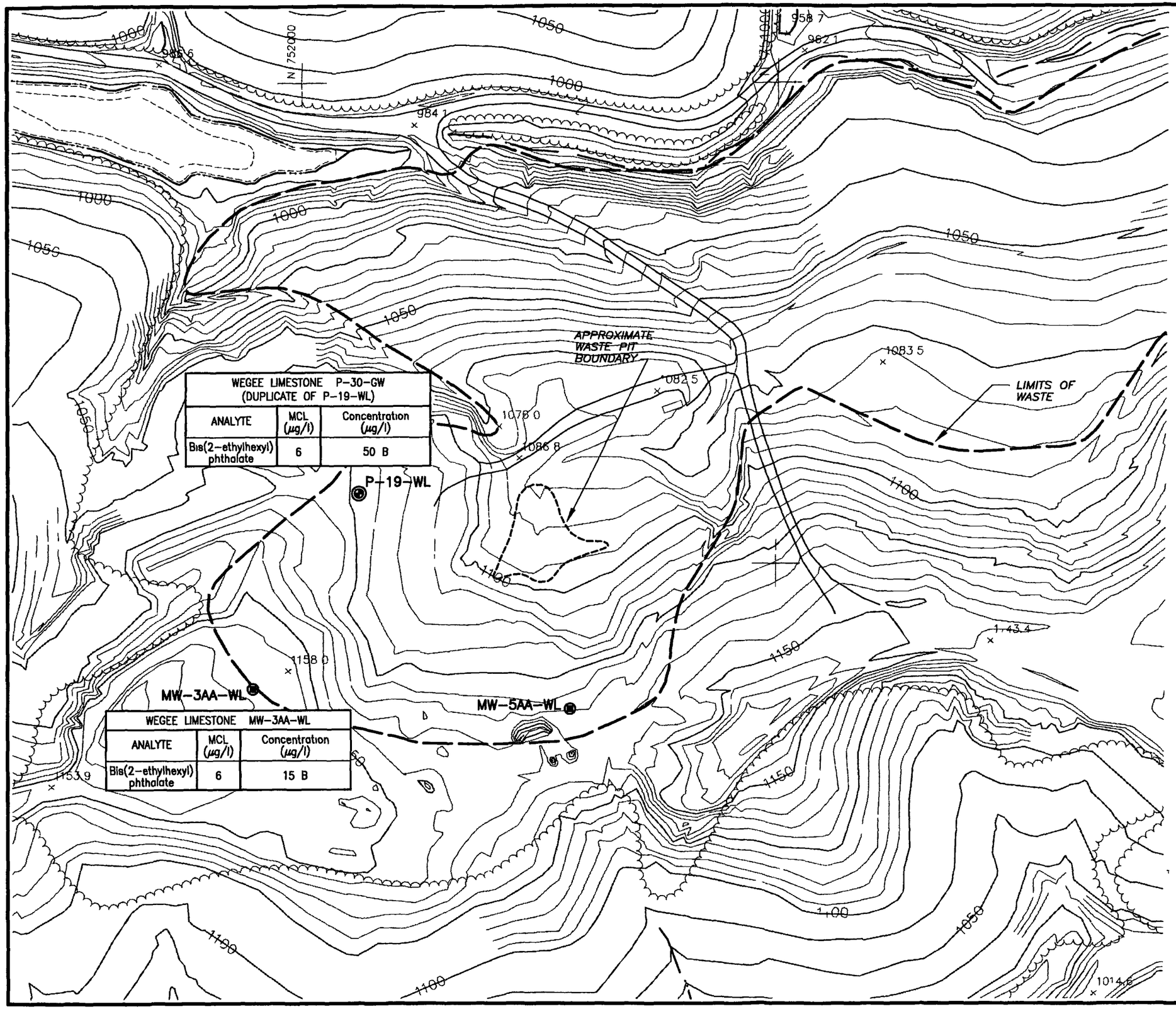


WEGEE LIMESTONE P-30-GW (DUPLICATE OF P-19-WL)		
ANALYTE	MCL (µg/l)	Concentration (µg/l)
Bis(2-ethylhexyl) phthalate	6	50 B

WEGEE LIMESTONE MW-3AA-WL		
ANALYTE	MCL (µg/l)	Concentration (µg/l)
Bis(2-ethylhexyl) phthalate	6	15 B

LEGEND

P-19-WL ◎ PIEZOMETER (INSTALLED AS PART OF PRE-DESIGN 1992)

MW-3AA-WL ◎ MONITORING WELL (INSTALLED AS PART OF RI/FS 1987)

MCL MAXIMUM CONTAMINANT LEVEL

B CONCENTRATION QUALIFIED AS PROBABLE BLANK CONTAMINATION

REFERENCE

AERIAL MAPPING PREPARED BY EASTERN MAPPING CO DATE MAY 12 1992 SCALE 1 =200

SCALE FEET

0 100 200 400

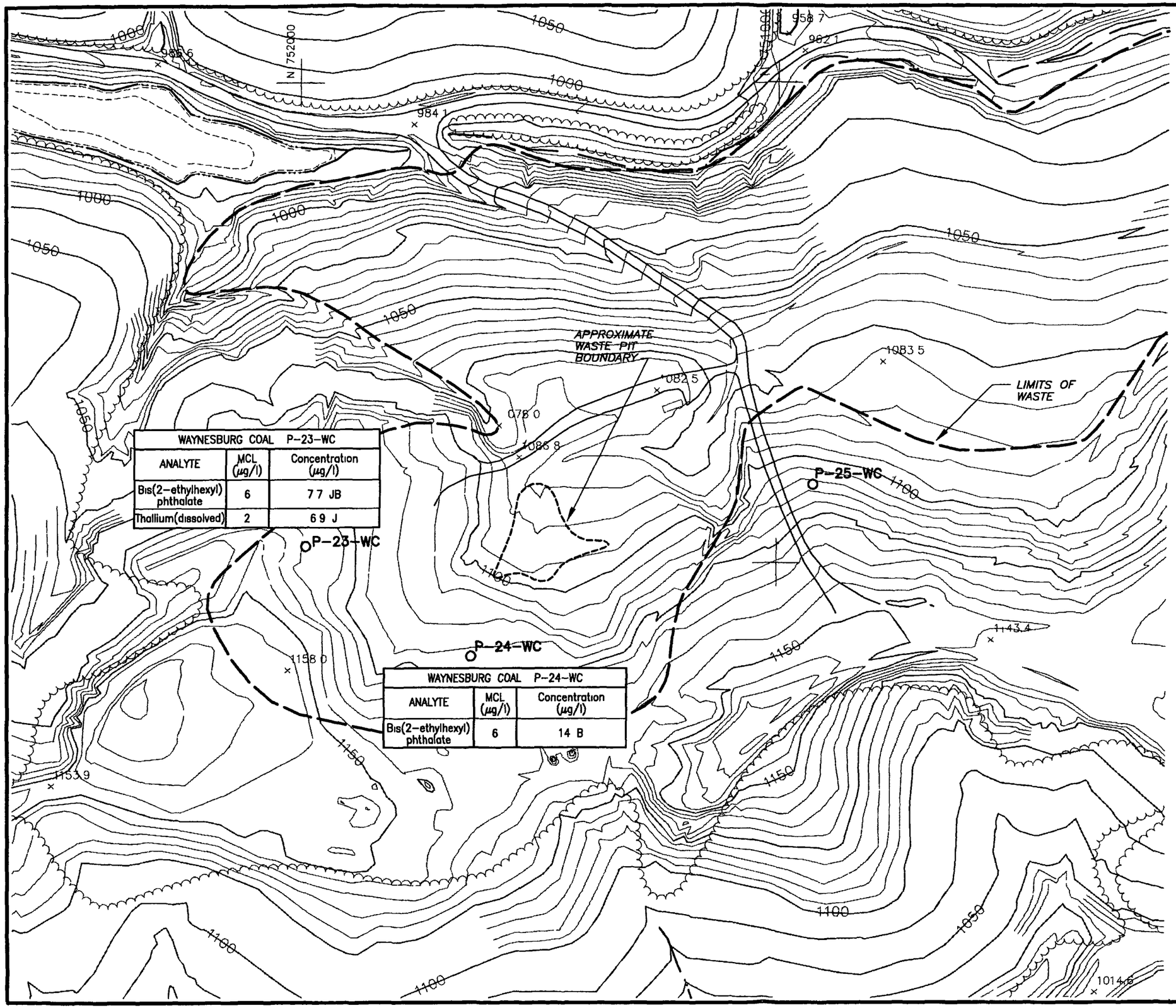
Drawn By raz 100801
Checked
Approved
Dwg Name: 144195-B37

BUCKEYE RECLAMATION LANDFILL SITE
BELMONT COUNTY, OHIO
PREPARED FOR
BUCKEYE RECLAMATION LANDFILL SETTLING DEFENDANTS
PITTSBURGH PENNSYLVANIA

Figure 4-1

GROUNDWATER SAMPLING LOCATIONS WHERE ANYLYTE CONCENTRATIONS EXCEED MAXIMUM CONTAMINANT LEVEL (MCL) WEGEE LIMESTONE - JULY/AUGUST 2001

ENVIRONMENTAL STRATEGIES CORPORATION
Four Penn Center West, Suite 315
Pittsburgh Pennsylvania 15276
(412) 787-5100



WAYNESBURG COAL P-23-WC		
ANALYTE	MCL (µg/l)	Concentration (µg/l)
Bis(2-ethylhexyl) phthalate	6	77 JB
Thallium(dissolved)	2	69 J

WAYNESBURG COAL P-24-WC		
ANALYTE	MCL (µg/l)	Concentration (µg/l)
Bis(2-ethylhexyl) phthalate	6	14 B

LEGEND

P-23-WC ○ PIEZOMETER (INSTALLED AS PART OF WASTE PIT AREA INVESTIGATION 1997)

MCL MAXIMUM CONTAMINANT LEVEL

J ESTIMATED CONCENTRATION

B CONCENTRATION QUALIFIED AS PROBABLE BLANK CONTAMINATION

REFERENCE

AERIAL MAPPING PREPARED BY EASTERN MAPPING CO DATE MAY 12 1992 SCALE 1 =200

SCALE FEET

0 100 200 400

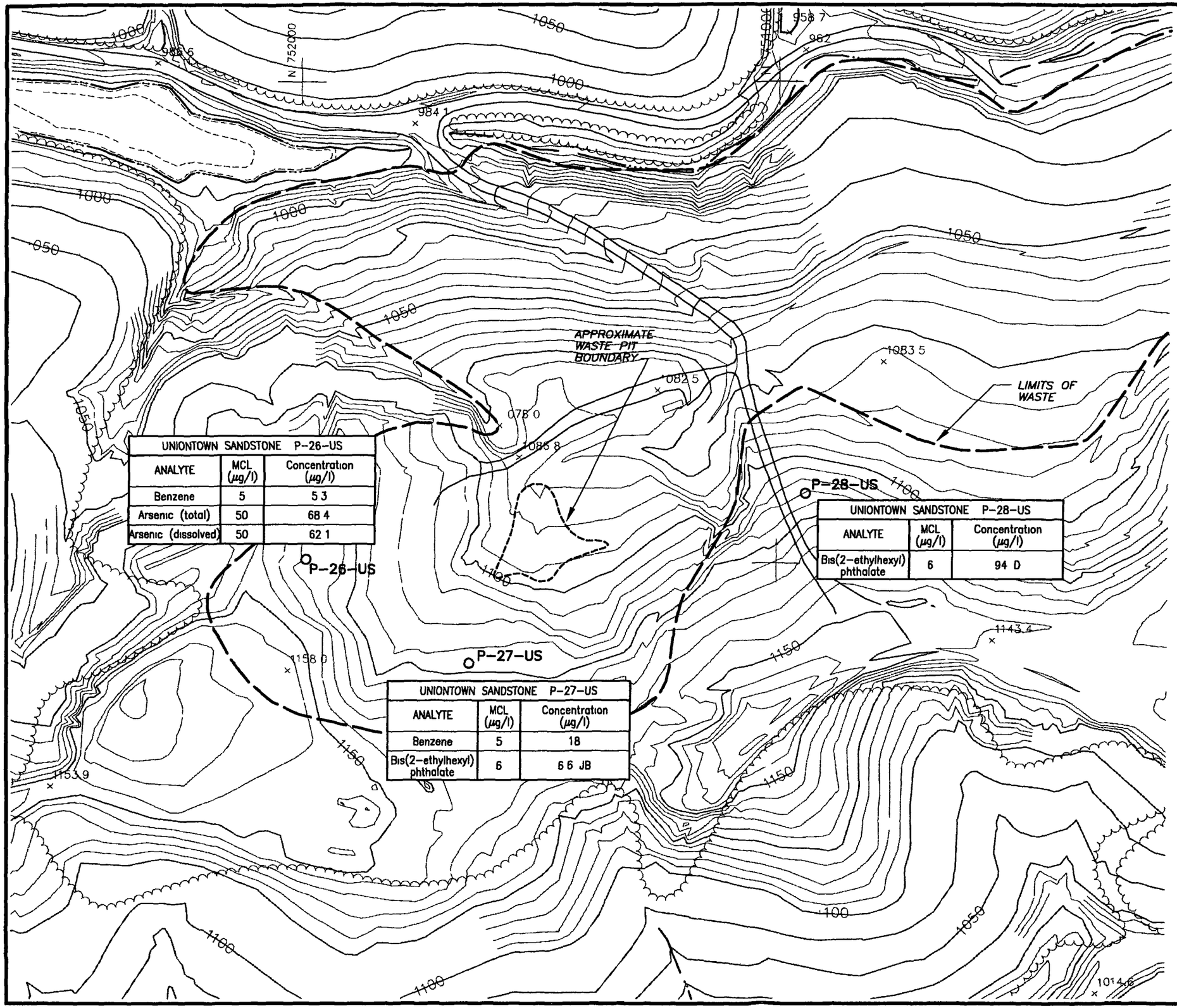
Drawn By RKZ 100801
Checked:
Approved:
Dwg Name 144195-B38

BUCKEYE RECLAMATION LANDFILL SITE
BELMONT COUNTY, OHIO
PREPARED FOR
BUCKEYE RECLAMATION LANDFILL SETTLING DEFENDANTS
PITTSBURGH PENNSYLVANIA

Figure 4-2

GROUNDWATER SAMPLING LOCATIONS WHERE ANYLYTE CONCENTRATIONS EXCEED MAXIMUM CONTAMINANT LEVEL (MCL) WAYNESBURG COAL - JULY/AUGUST 2001

ENVIRONMENTAL STRATEGIES CORPORATION
Four Penn Center West Suite 315
Pittsburgh Pennsylvania 15276
(412) 787-5100



UNIONTOWN SANDSTONE P-26-US		
ANALYTE	MCL (µg/l)	Concentration (µg/l)
Benzene	5	5 3
Arsenic (total)	50	68 4
Arsenic (dissolved)	50	62 1

UNIONTOWN SANDSTONE P-27-US		
ANALYTE	MCL (µg/l)	Concentration (µg/l)
Benzene	5	18
Bis(2-ethylhexyl) phthalate	6	6 6 JB

UNIONTOWN SANDSTONE P-28-US		
ANALYTE	MCL (µg/l)	Concentration (µg/l)
Bis(2-ethylhexyl) phthalate	6	94 D

LEGEND

P-26-US PIEZOMETER (INSTALLED AS PART OF WASTE PIT AREA INVESTIGATION 1997)

MCL MAXIMUM CONTAMINANT LEVEL

J ESTIMATED CONCENTRATION

B CONCENTRATION QUALIFIED AS PROBABLE BLANK CONTAMINATION

D CONCENTRATION FROM A SECONDARY DILUTION

REFERENCE:
AERIAL MAPPING PREPARED BY EASTERN MAPPING CO DATE: MAY 12 1992 SCALE 1 =200

SCALE FEET
0 100 200 400

Drawn By: RAZ 100901
Checked:
Approved:
Dwg Name: 144195-B39

BUCKEYE RECLAMATION LANDFILL SITE
BELMONT COUNTY OHIO
PREPARED FOR
BUCKEYE RECLAMATION LANDFILL SETTLING DEFENDANTS
PITTSBURGH PENNSYLVANIA

Figure 4-3

GROUNDWATER SAMPLING LOCATIONS WHERE ANYLYTE CONCENTRATIONS EXCEED MAXIMUM CONTAMINANT LEVEL (MCL) UNIONTOWN SANDSTONE - JULY/AUGUST 2001

ENVIRONMENTAL STRATEGIES CORPORATION
ESC
Four Penn Center West, Suite 315
Pittsburgh Pennsylvania 15276
(412) 787-5100

Appendix A – Summary Table of Groundwater Analytical Results

Table 1

Groundwater Sampling Results
Buckeye Reclamation Landfill
Belmont County Ohio
July 17 19 and August 7 2001 (a)

Compound	Monitoring Well/Piezometer Number										Trip and Equipment Blank Samples				
VOCs (ug/l)	MW 3AA WL	MW 5AA WL	P 19-WL	P 30-GW (b)	P 23-WC	P 24 WC	P 25WC	P 26-US	P 27 US(c)	P 28-US	TB 071701	TB 071801	TB 071901	EB 1	TB080701
Bromochloromethane	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
1,2 Dichlorobenzene	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
1 4-Dichlorobenzene	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Cis-1,2-Dichloroethene	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Xylenes (total)	15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U	5 U	5 U	15 U
Acetone	20 U	20 U	20 U	20 U	11 JB	20 U	20 U	20 U	25 B	20 U	20 U	20 U	6 3 J	14 J	20 U
Acrylonitrile	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Benzene	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 3	18	5 U	5 U	5 U	5 U	5 U	5 U
Bromodichloromethane	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Bromoform	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Bromethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2-Butanone (MEK)	20 U	20 U	20 U	20 U	12 J	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
Carbon Disulfide	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Carbon Tetrachloride	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Chlorobenzene	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Chloroethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chloroform	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Chloromethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dibromochlorormethane	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
1,2 Dibro-3-chloropropane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1 2-Dibromoethane (EDB)	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Dibromomethane	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Trans-1,4-Dichloro-2 butene	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
1 1 Dichloroethane	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
1,2 Dichloroethane	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
1 1 Dichloroethene	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Trans 1 2 Dichloroethene	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
1,2 Dichloropropane	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Cis 1,2 Dichloropropene	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Trans-1,3 Dichloropropene	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Ethylbenzene	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
2-Hexanone	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
Iomethane	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Methylene Chloride	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
4-Methyl-2-pentanone (MIBK)	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
Styrene	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
1 1 1,2 Tetrachloroethane	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
1 1 2,2-Tetrachloroethane	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Tetrachloroethene	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Toluene	5 U	5 U	5 U	5 U	5 U	5 U	5 U	1 3 J	1 3 J	5 U	5 U	5 U	5 U	5 U	5 U
1 1 1 Trichloroethane	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
1 1 2 Trichloroethane	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Trichloroethene	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Trichlorofluoromethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,2,3 Trichloropropane	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Vinyl Acetate	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Vinyl Chloride	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U

Table 1 (*continued*)

Groundwater Sampling Results
Buckeye Reclamation Landfill
Belmont County Ohio
July 17 19 and August 7 2001 (a)

	Monitoring Well/Piezometer Number										Trip and Equipment Blank Samples				
Compound	MW 3AA WL	MW 5AA WL	P-19-WL	P-30-GW (b)	P 23-WC	P 24-WC	P 25WC	P 26-US	P 27 US(c)	P 28-US	TB 071701	TB 071801	TB 071901	EB 1	TB080701
SVOCs (ug/l)															
Bis(2-Ethylhexyl) Phthalate	15 B	5 8 JB	10 U	50 B	7 7 JB	14 B	10 U	10 U	6 6 JB	94 D	NA	NA	NA	6 5 J	NA
PAHs (ug/l)	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	10 U	NA
Naphthalene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	10 U	NA
Fluorene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	10 U	NA
Phenanthrene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	10 U	NA
Anthracene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	10 U	NA
Pyrene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	10 U	NA
Benzo(a) Anthracene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	10 U	NA
Chrysene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	10 U	NA
Benzo(b) Fluoranthene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	10 U	NA
Benzo(k) Fluoranthene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	10 U	NA
Benzo (a) Pyrene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	10 U	NA
Indeno (1,2,3-cd) Pyrene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	10 U	NA
Dibenzo (a,h) Anthracene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	10 U	NA
Benzo (ghi) Perylene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	10 U	NA
Total Metals (ug/l)															
Antimony	4 1 U	4 1 U	4 1 U	4 1 U	4 1 U	4 1 U	4 1 U	4 1 U	NA	4 1 U	NA	NA	NA	4 1 U	NA
Arsenic	2 6	3 1	2 0 U	2 0 U	16 2	3 7	2 0 U	68 4	NA	7 5	NA	NA	NA	2.0 U	NA
Barium	46 7 J	22.9 J	19 3 J	18 8 J	149 J	53 6 J	51 8 J	744	NA	23 2 J	NA	NA	NA	0 44 J	NA
Beryllium	0 40 J	0 49 J	0 40 J	0 48 J	0 15 J	0 41 J	0 52 J	0 16 J	NA	0 57 J	NA	NA	NA	0 36	NA
Cadmium	0 63 U	0 63 U	0 63 U	0 63 U	0 63 U	0 63 U	1 6	0 63 U	NA	0 63 U	NA	NA	NA	0 63 U	NA
Calcium	354 000	101 000	432,000	437 000	9 770	10 600	467 000	16 300	NA	51 200	NA	NA	NA	27 7 U	NA
Chromium	3 1	2 0	2 2	2.1	1 9 J	3 1	2 4	1 5 J	NA	4 2	NA	NA	NA	1 1 U	NA
Cobalt	5 5	2 6 U	4 6	3 2	2 6 U	2 6 U	2 6 U	8 9 J	NA	2.6 U	NA	NA	NA	2 6 U	NA
Copper	1 3 U	4 3	1 3 U	1 3 U	1 8 U	3 1	19 7	3 7 J	NA	2.5	NA	NA	NA	1 3 U	NA
Iron	19 200 J	673 J	462 J	405 J	4 220	336 J	1 440 J	16 900	NA	1 860 J	NA	NA	NA	100 J	NA
Lead	1 8 U	1 8 U	1 8 U	1 8 U	1 8 U	1 8 U	1 8 U	2 2 J	NA	1 8 U	NA	NA	NA	1 8 U	NA
Magnesium	165 000	67 700	170 000	170 000	722 J	3 630	207 000	4 470	NA	22 000	NA	NA	NA	21 3 U	NA
Manganese	2,150	95 9	1,500	1 510	354	26 5	3 510	389	NA	212	NA	NA	NA	0 75 U	NA
Nickel	11 5	7 9 U	7 9 U	7 9 U	7 9 U	7 9 U	7 9 U	8 7 J	NA	7 9 U	NA	NA	NA	7 9 U	NA
Potassium	8 05	10,200	4,570	4 550	59 100	2,480	31 800	2,980	NA	4 200	NA	NA	NA	519 U	NA
Selenium	3 2 U	3 2 U	3 2 U	3 2 U	3 2 U	3 2 U	3 2 U	3 2 U	NA	3 2 U	NA	NA	NA	3 2 U	NA
Silver	0 75 U	0 75 U	0 75 U	0 75 U	0 75 U	0.75 U	0 75 U	0 75 U	NA	0 75 U	NA	NA	NA	0 75 U	NA
Sodium	259 000	731 000	90 100	89 600	394 000	276 000	224 000	1 180 000	NA	1 100 000	NA	NA	NA	15 0 U	NA
Thallium	5 7 U	5 7 U	5 7 U	5 7 U	5 7 U	5 7 U	5 7 U	5 7 U	NA	5 7 U	NA	NA	NA	5 7 U	NA
Vanadium	5 0	4 1 U	5 4	5 5	4 1 U	4 1 U	5 1	4 1 U	NA	4 1 U	NA	NA	NA	4 1 U	NA
Zinc	4 8 J	4 2 J	4 3 J	3 2 U	11 4 J	12 4 J	3 2 U	8 4 J	NA	3 2 U	NA	NA	NA	3 6	NA
Dissolved Metals (ug/l)															
Antimony	NA	NA	NA	NA	4 1 U	NA	4 1 U	4 1 U	NA	4 1 U	NA	NA	NA	NA	NA
Arsenic	NA	NA	NA	NA	15 0	NA	2 0 U	62 1	NA	6 4	NA	NA	NA	NA	NA
Barium	NA	NA	NA	NA	133 J	NA	25 1	585	NA	19 8	NA	NA	NA	NA	NA
Beryllium	NA	NA	NA	NA	0 20 J	NA	0 45	0 23 J	NA	0 40	NA	NA	NA	NA	NA
Cadmium	NA	NA	NA	NA	0 63 U	NA	0 63 U	0 63 U	NA	0 63 U	NA	NA	NA	NA	NA
Calcium	NA	NA	NA	NA	8 820	NA	442 000	14 800	NA	45 200	NA	NA	NA	NA	NA
Chromium	NA	NA	NA	NA	1 1 U	NA	1 9	1 1 U	NA	1 4	NA	NA	NA	NA	NA
Cobalt	NA	NA	NA	NA	2 6 U	NA	2.6 U	4 3 J	NA	2 6 U	NA	NA	NA	NA	NA

Table 1 (continued)

Groundwater Sampling Results
Buckeye Reclamation Landfill
Belmont County Ohio
July 17 19 and August 7 2001 (a)

Compound	Monitoring Well/Piezometer Number										Trip and Equipment Blank Samples				
Dissolved Metals (continued) (µg/l)	MW 3AA WL	MW 5AA WL	P 19-WL	P 30-GW (b)	P 23-WC	P 24-WC	P 25WC	P 26-US	P 27 US(c)	P 28-US	TB 071701	TB 071801	TB 071901	EB 1	TB080701
Copper	NS	NS	NS	NS	3 0 J	NS	1 3 U	5 2 J	NA	1 6	NA	NA	NA	NA	NA
Iron	NS	NS	NS	NS	2 040	NS	1 150	8 120	NA	1 840	NA	NA	NA	NA	NA
Lead	NS	NS	NS	NS	1 8 U	NS	1 8 U	1 8 U	NA	1 8 U	NA	NA	NA	NA	NA
Magnesium	NS	NS	NS	NS	662 J	NS	203 000	4 280 J	NA	19 700	NA	NA	NA	NA	NA
Manganese	NS	NS	NS	NS	320	NS	3 320	303	NA	215	NA	NA	NA	NA	NA
Nickel	NS	NS	NS	NS	7 9 U	NS	7 9 U	15 9 J	NA	7 9 U	NA	NA	NA	NA	NA
Potassium	NS	NS	NS	NS	55 700	NS	28 000	3 280 J	NA	3 660	NA	NA	NA	NA	NA
Selenium	NS	NS	NS	NS	3 2 U	NS	3 2 U	3 2 U	NA	3 2 U	NA	NA	NA	NA	NA
Silver	NS	NS	NS	NS	0 75 U	NS	0 75 U	1 0 J	NA	0 75 U	NA	NA	NA	NA	NA
Sodium	NS	NS	NS	NS	388 000	NS	217 000	1 130,000	NA	1 050 000	NA	NA	NA	NA	NA
Thallium	NS	NS	NS	NS	6 9 J	NS	5 7 U	5 7 U	NA	5 7 U	NA	NA	NA	NA	NA
Vanadium	NS	NS	NS	NS	4 1 U	NS	4 1 U	4 1 U	NA	4 1 U	NA	NA	NA	NA	NA
Zinc	NS	NS	NS	NS	4 8 J	NS	3 2 U	6 9 J	NA	3 2 U	NA	NA	NA	NA	NA
General Chemistry Parameters (mg/l)															
Total Acidity	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	NA	10 U	NA	NA	NA	10 U	NA
Total Alkalinity	675	553	718	720	878	501	1 070	2 660	2 020	1 060	NA	NA	NA	5 U	NA
Total Organic Carbon (TOC)	7 1	4 0	7 1	8 3	27 1	4 5	8 2	78 1	35 6	5 6	NA	NA	NA	1 U	NA
Chloride	95 6	79 2	118	120	77 1	103	66 4	48 0	99 3	65 2	NA	NA	NA	1 U	NA
Cyanide-amenable	0 010 U	0 010 U	0 010 U	0 010 U	0 010 U	0 010 U	0 010 U	0 010 U	NA	0 010 U	NA	NA	NA	0 010 U	NA
Cyanide-free	*0 010 U*	*0 010 U*	*0 010 U*	*0 010 U*	*0 010 U*	*0 010 U*	*0 010 U*	*0 010 U*	NA	*0 010 U*	NA	NA	NA	*0 010 U*	NA
Cyanide-total	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	NA	10 U	NA	NA	NA	10 U	NA
Biochemical Oxygen Demand (BOD)	4 7	2 U	2.4	2 4	80 9	66 9	6 9	80 2	NA	8 6	NA	NA	NA	2 U	NA
Chemical Oxygen Demand (COD)	24 2	10 U	26 4	28 6	143	69 9	14 3	242	NA	10 U	NA	NA	NA	10 U	NA
Nitrate-Nitrite	0 10 U	0 10 U	0 10 U	0 10 U	0 10 U	0 11	0 10 U	0 10 U	NA	0 10 U	NA	NA	NA	0 10 U	NA
Ammonia Nitrogen	1 5	0 73	0 18 B	0 19 B	0 98	0 49 B	1 9	0 96	NA	1 5	NA	NA	NA	0 12	NA
Oil and Grease	5 U	5 U	5 U	5 U	5 2	5 U	5 U	11 5	5 U	5 U	NA	NA	NA	5 U	NA
Total Dissolved Solids (TDS)	3 010	2,820	2 630	2,550	1 160	905	3 300	3 210	NA	3 200	NA	NA	NA	10 U	NA
Total Suspended Solids (TSS)	35 2	10 4	9 6	6 0	20 4	4 U	38 4	29 0	NA	17 2	NA	NA	NA	4 U	NA
Sulfate	1 410	1 500	1 130	1 070	10 G	50 1	1 560	10 G	5 U	1 450	NA	NA	NA	5 U	NA
Total Sulfide	1 U	1 U	1 U	1 U	1 U	14 8	1 U	1 U	NA	1 U	NA	NA	NA	1 U	NA
Total Phosphorus	0 10 U	0 10 U	0.10 U	0 10 U	0 10 U	0.10 U	0 10 U	0.22	NA	0 10 U	NA	NA	NA	0 10 U	NA
Turbidity (NTUs)	46	8 7	1 7	2	1 080	241	37 4	102	NA	23 4	NA	NA	NA	0 50 U	NA

a/ U=Undetected at method detection limit; J=Estimated concentration, NA=Not analyzed, B=Probable blank contamination TB=Trip blank; EB=Equipment blank; D=results from a secondary dilution, NS=Not sampled during monitoring event; VOCs=Volatile organic compounds, SVOC=Semi-volatile organic compound, PAHs=Polycylic aromatic hydrocarbons

ug/l=Micrograms per liter mg/l=Milligrams per liter NTUs=Nephelometric turbidity units G=elevated detection limit due to matrix interference.

b/ Duplicate sample of P 19 WL.

c/ Specific parameters not analyzed due to insufficient groundwater column.

Appendix B – Quality Assurance/Quality Control Report

ENVIRONMENTAL STRATEGIES CORPORATION

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DATA VALIDATION SUMMARY REPORT
INTERIM GROUNDWATER MONITORING
2001 FORMER WASTE PIT AREA
BUCKEYE LANDFILL RECLAMATION SITE
BELMONT COUNTY, OHIO

PREPARED

BY

ENVIRONMENTAL STRATEGIES CORPORATION

SEPTEMBER 24, 2001

Docs/buckeye/144195/gw072001.doc

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Introduction

This data validation review includes analytical data from 10 groundwater samples and associated field and laboratory quality control (QC) samples collected by Environmental Strategies Corporation (ESC) at the Buckeye Reclamation Landfill Site in Belmont County, Ohio on July 17 18 19 and August 7, 2001 The samples were analyzed by STL-Inc Pittsburgh Pennsylvania for volatile organic compounds (VOCs), polyaromatic hydrocarbons (PAHs) and bis-(2-ethylhexyl)phthalate (B2EHP) total and dissolved metals and the inorganic parameters acidity alkalinity, total organic carbon (TOC), chloride total amenable and free cyanide, biochemical oxygen demand (BOD), chemical oxygen demand (COD) nitrate-nitrite ammonia nitrogen oil and grease, total dissolved solids (TDS), total suspended solids (TSS) sulfate total sulfide, total phosphorous and turbidity The samples were analyzed utilizing methods from U S Environmental Protection Agency (EPA) Methods "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods" (SW-846), Third Edition Update III (1997), EPA Methods for Chemical Analysis of Water and Waste ' (MCAWW) (1983) and US Public Health Service Standard Methods for the Examination of Water and Wastewater , 18th Edition 1996 (SM-18) as follows

Parameter	Method of Analysis
VOCs	SW-846 8260
PAHs and B2EHP	SW-846 8270
Total and dissolved metals	SW-846 6010
Acidity	MCAWW 305 1
Alkalinity	MCAWW 310 1
TOC	MCAWW 415 1
Chloride	MCAWW 325 2
Amenable total cyanide	SW-846 9012
Free cyanide	SM-18 4500-CN I
BOD	MCAWW 405 1
COD	MCAWW 410 4
Nitrate-nitrite	MCAWW353 2
Ammonia nitrogen	MCAWW 350 1
Oil and grease	MCAWW 413 1
TDS	MCAWW 160 1
TSS	MCAWW 160 2
Sulfate	MCAWW 375 4
Total sulfide	MCAWW 376 1
Total phosphorous	MCAWW 365 2
Turbidity	MCAWW 180 1

This report presents a discussion of the data quality for each fraction (i e VOCs, PAHs and B2EHP metals and inorganics) The qualified analytical data are presented in Table 1 The QC data are presented in Tables A-1 through A-6 and the data qualifier definitions are presented in Attachments A and B Field QC and overall assessment of the analytical data are discussed in separate sections of this report

A summary of the individual samples and the analyses conducted is presented in Table A-1

The analytical data were validated and qualified according to the EPA Contract Laboratory Program (CLP) National Functional Guidelines for Organic Data Review (EPA-540/R-94/012, February 1994), the EPA CLP National Functional Guidelines for Inorganic Data Review (EPA-540/R-94/013, February 1994), EPA Region V Standard Operating Procedure for Validation of CLP Organic Data (August 1993), and method specific criteria

The VOC PAH and B2EHP data were reviewed for holding times from date of sample collection, surrogate recoveries matrix spike/matrix spike duplicate (MS/MSD), method equipment and trip blanks (VOCs only) instrument performance (GC/MS tune) initial and continuing calibration internal standard performance, chromatographic and mass spectral raw data, field duplicates and overall assessment of the VOC and PAH/B2EHP data

The metals data were reviewed for holding times from date of sample collection, calibration blanks interference check sample (ICS), laboratory control sample (LCS), matrix spike (MS), laboratory duplicate, post digestion spike recovery, inductively coupled plasma (ICP) serial dilution, preparation and analysis logs, practical quantitation limits (PQLs) instrument raw data, field duplicate, and overall assessment of the inorganic data

The inorganic parameters were reviewed for holding times from date of sample collection, calibration blanks LCS, MS/MSD, laboratory duplicate, preparation and analysis logs, detection limits, instrument raw data, field duplicate, and overall assessment of the inorganic data

VOCs

All samples were analyzed within the required method holding times Holding times are presented in Table A-2 Acetone was detected in the equipment blank (EB-1) collected on

07/18/01 and the trip blank collected on 07/19/01 (TB-071901) Positive results for acetone in samples P 23-WC and P-27-US were considered undetected as probable blank contamination (B) Equipment and trip blank contamination are presented in Table A-3 All other QC criteria including surrogate recoveries, MS/MSD recoveries and precision LCS GC/MS tune, initial and continuing calibration internal standard performance, chromatographic and mass spectral raw data were within acceptable limits

PAHs and B2EHP

The samples were extracted and analyzed within the required method holding times Holding times are presented in Table A-2 B2EHP was detected in the equipment blank (EB-1) Results for B2EHP that were less than 10 times the concentration in the blank were considered undetected as probable blank contamination (B) This includes all samples except P-28-US The MS/MSD recoveries for acenaphthene were outside of recommended QC limits No action was taken on the data because data are not qualified on MS/MSD results alone MS/MSD results are presented in Table A-4 The result for B2EHP in sample P-28-US was reported from a secondary dilution (D) due to matrix interference All other QC criteria including surrogate recoveries, method and equipment blanks, instrument performance (GC/MS tune), initial and continuing calibration, internal standard performance, chromatographic and mass spectral raw data were within acceptable limits

Total and Dissolved Metals

The dissolved metals were field filtered through a 0 45um filter The samples were prepared and analyzed within the required method holding times Holding times are presented in Table A-2 The serial dilution results for total barium and total iron were outside of QC limits for samples MW-3AA-WL, MW-5AA-WL P-19 WL, P-30-WL, P-24-WC, and P-25-WC Results for these metals in these samples were considered estimated (J) The MS/MSD recoveries for total iron and sodium could not be measured because the concentration of these metals was greater than four times the spike added No action was taken on the data ICP serial dilutions outside of QC limits are presented in table A-5 Total barium, beryllium, iron and zinc were detected in the equipment blank at trace concentrations Results for these analytes in the corresponding samples were considered undetected as probable blank contamination if the

concentration in the sample was less the five time the concentration of the level in the blank All other QC criteria including calibration blanks interference check sample, LCS, preparation and analysis logs instrument detection limits instrument raw data were within acceptable QC limits

Inorganic Analytes

All samples were analyzed within the required method holding times Holding times are presented in Table A-2 Ammonia-nitrogen was detected in the equipment blank Results for ammonia-nitrogen in samples P-19-WL, P-30-GW and P-24-WC were considered undetected as probable blank contamination (B) All QC criteria including calibration blanks LCS, MS/MSD laboratory duplicate, preparation and analysis logs, detection limits, and instrument raw data were within acceptable limits

Field Quality Control

Three trip blanks were analyzed for VOCs to assess cross contamination during sample transit from the field to the laboratory Acetone was detected in the trip blank collected on 7/19/01 None of the samples collected on 7/19/01 were affected

One equipment blank (EB-1) was collected for the same parameters as the samples to assess the efficiency of the decontamination process Acetone, B2EHP, barium beryllium, iron, zinc and ammonia-nitrogen were detected in the equipment blank The corresponding sample results for these analytes were qualified as undetected (U) or as probable blank contamination (B) if the concentration in the sample was less than five times (10 times for acetone and B2EHP) the concentration in the blank Acetone is a common laboratory contaminant and B2EHP is a plasticizer used in plastics and latex gloves and is ubiquitous in the environment Trip and Equipment blank contamination is presented in Table A-3

One blind field duplicate was collected with these samples P-30-GW was a blind field duplicate of P-19-WL Analytes detected in both samples included and the calculated relative percent differences (RPDs) are presented on Table A-6

RPDs of 30 or less indicate excellent field and laboratory precision and a homogeneous sample matrix Analytes detected at or near the detection limit usually exhibit higher variability as is the case with total cobalt and TSS

Overall Assessment of the Data

All samples were analyzed within the required method holding times Acetone which is a common laboratory contaminant was detected in the equipment blank (EB-1) and one trip blank (TB-071901) B2EHP was also detected in the equipment blank The effect on the data was discussed above Several metals and ammonia-nitrogen at trace concentrations were also detected in the equipment blank The MS/MSD for one PAH was outside of recommended QC limits No action was taken on the data Two serial dilutions in the metals analysis were outside of QC limits Results were considered estimated Based on the above review, the data, with qualification, are of acceptable quality and usable for the purpose of assessing groundwater concentrations at the Buckeye Reclamation Landfill site

Table 1

Groundwater Sampling Results
Buckeye Reclamation Landfill
Belmont County Ohio
July 17 19 and August 7 2001 (a)

Compound	Monitoring Well/Piezometer Number										Trip and Equipment Blank Samples				
VOCs (ug/l)	MW 3AA WL	MW 5AA WL	P 19 WL	P 30-GW (b)	P-23-WC	P 24-WC	P 25WC	P 26-US	P 27 US(c)	P 28 US	TB 071701	TB 071801	TB 071901	EB 1	TB080701
Bromochloromethane	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
1,2 Dichlorobenzene	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
1 4-Dichlorobenzene	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Cis-1,2 Dichloroethene	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Xylenes (total)	15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U	5 U	5 U	15 U
Acetone	20 U	20 U	20 U	20 U	11 JB	20 U	20 U	20 U	25 B	20 U	20 U	20 U	6 3 J	14 J	20 U
Acrylonitrile	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Benzene	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 3	18	5 U	5 U	5 U	5 U	5 U	5 U
Bromodichloromethane	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Bromoform	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Bromethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2-Butanone (MEK)	20 U	20 U	20 U	20 U	12 J	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
Carbon Disulfide	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Carbon Tetrachloride	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Chlorobenzene	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Chloroethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chloroform	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Chloromethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dibromochlorormethane	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
1,2-Dibro-3-chloropropane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1 2 Dibromoethane (EDB)	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Dibromomethane	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Trans 1 4-Dichloro-2 butene	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
1 1 Dichloroethane	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
1,2 Dichloroethane	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
1 1 Dichloroethene	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Trans-1 2 Dichloroethene	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
1,2 Dichloropropane	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Cis 1,2 Dichloropropene	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Trans-1,3-Dichloropropene	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Ethylbenzene	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
2 Hexanone	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
Iomethane	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Methylene Chlonde	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
4-Methyl-2 pentanone (MIBK)	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
Styrene	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
1 1 1,2 Tetrachloroethane	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
1 1 2 2 Tetrachloroethane	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Tetrachloroethene	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Toluene	5 U	5 U	5 U	5 U	5 U	5 U	5 U	1 3 J	1 3 J	5 U	5 U	5 U	5 U	5 U	5 U
1 1 1 Trichloroethane	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
1 1 2 Trichloroethane	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Trichloroethene	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Trichlorofluoromethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,2 3 Trichloropropane	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Vinyl Acetate	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Vinyl Chloride	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U

Table 1 (continued)

Groundwater Sampling Results
Buckeye Reclamation Landfill
Belmont County Ohio
July 17 19 and August 7 2001 (a)

	Monitoring Well/Piezometer Number										Trip and Equipment Blank Samples				
Compound	MW 3AA WL	MW 5AA WL	P 19-WL	P 30-GW (b)	P 23-WC	P 24-WC	P 25WC	P 26-US	P 27 US(c)	P 28-US	TB 071701	TB 071801	TB 071901	EB 1	TB080701
SVOCs (ug/l)															
Bis(2 Ethylhexyl) Phthalate	15 B	5 8 JB	10 U	50 B	7 7 JB	14 B	10 U	10 U	6 6 JB	94 D	NA	NA	NA	6 5 J	NA
PAHs (ug/l)	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	10 U	NA
Naphthalene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	10 U	NA
Florene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	10 U	NA
Phenanthrene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	10 U	NA
Anthracene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	10 U	NA
Pyrene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	10 U	NA
Benzo(a) Anthracene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	10 U	NA
Chrysene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	10 U	NA
Benzo(b) Fluoranthene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	10 U	NA
Benzo(k) Fluoranthene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	10 U	NA
Benzo (a) Pyrene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	10 U	NA
Indeno (1,2 3-cd) Pyrene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	10 U	NA
Dibenzo (a,h) Anthracene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	10 U	NA
Benzo (ghi) Perylene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	10 U	NA
Total Metals (ug/l)															
Antimony	4 1 U	4 1 U	4 1 U	4 1 U	4 1 U	4 1 U	4 1 U	4 1 U	NA	4 1 U	NA	NA	NA	4 1 U	NA
Arsenic	2 6	3 1	2.0 U	2.0 U	16 2	3 7	2 0 U	68 4	NA	7 5	NA	NA	NA	2 0 U	NA
Barium	46 7 J	22 9 J	19 3 J	18 8 J	149 J	53 6 J	51 8 J	744	NA	23 2 J	NA	NA	NA	0 44 J	NA
Beryllium	0 40 J	0.49 J	0 40 J	0 48 J	0 15 J	0 41 J	0 52 J	0 16 J	NA	0 57 J	NA	NA	NA	0 36	NA
Cadmium	0 63 U	0 63 U	0 63 U	0 63 U	0 63 U	0 63 U	1 6	0 63 U	NA	0 63 U	NA	NA	NA	0 63 U	NA
Calcium	354 000	101 000	432 000	437 000	9 770	10 600	467 000	16 300	NA	51 200	NA	NA	NA	27 7 U	NA
Chromium	3 1	2 0	2 2	2 1	1 9 J	3 1	2 4	1 5 J	NA	4 2	NA	NA	NA	1 1 U	NA
Cobalt	5 5	2 6 U	4 6	3 2	2 6 U	2 6 U	2 6 U	8 9 J	NA	2 6 U	NA	NA	NA	2 6 U	NA
Copper	1 3 U	4 3	1 3 U	1 3 U	1 8 U	3 1	19 7	3 7 J	NA	2.5	NA	NA	NA	1 3 U	NA
Iron	19 200 J	673 J	462 J	405 J	4 220	336 J	1 440 J	16 900	NA	1 860 J	NA	NA	NA	10 0 J	NA
Lead	1 8 U	1 8 U	1 8 U	1 8 U	1 8 U	1 8 U	1 8 U	2 2 J	NA	1 8 U	NA	NA	NA	1 8 U	NA
Magnesium	165 000	67 700	170 000	170 000	722 J	3 630	207 000	4 470	NA	22 000	NA	NA	NA	21 3 U	NA
Manganese	2,150	95 9	1 500	1 510	354	26 5	3 510	389	NA	212	NA	NA	NA	0 75 U	NA
Nickel	11 5	7 9 U	7 9 U	7 9 U	7 9 U	7 9 U	7 9 U	8 7 J	NA	7 9 U	NA	NA	NA	7 9 U	NA
Potassium	8 05	10 200	4 570	4 550	59 100	2 480	31 800	2 980	NA	4 200	NA	NA	NA	519 U	NA
Selenium	3 2 U	3 2 U	3 2 U	3 2 U	3 2 U	3 2 U	3 2 U	3 2 U	NA	3 2 U	NA	NA	NA	3 2 U	NA
Silver	0 75 U	0.75 U	0 75 U	0.75 U	0 75 U	0 75 U	0 75 U	0 75 U	NA	0 75 U	NA	NA	NA	0.75 U	NA
Sodium	259 000	731 000	90 100	89 600	394 000	276 000	224 000	1 180 000	NA	1 100 000	NA	NA	NA	15 0 U	NA
Thallium	5 7 U	5 7 U	5 7 U	5 7 U	5 7 U	5 7 U	5 7 U	5 7 U	NA	5 7 U	NA	NA	NA	5 7 U	NA
Vanadium	5 0	4 1 U	5 4	5 5	4 1 U	4 1 U	5 1	4 1 U	NA	4 1 U	NA	NA	NA	4 1 U	NA
Zinc	4 8 J	4 2 J	4 3 J	3 2 U	11 4 J	12 4 J	3 2 U	8 4 J	NA	3 2 U	NA	NA	NA	3 6	NA
Dissolved Metals (ug/l)															
Antimony	NA	NA	NA	NA	4 1 U	NA	4 1 U	4 1 U	NA	4 1 U	NA	NA	NA	NA	NA
Arsenic	NA	NA	NA	NA	15 0	NA	2 0 U	62 1	NA	6 4	NA	NA	NA	NA	NA
Barium	NA	NA	NA	NA	133 J	NA	25 1	585	NA	19 8	NA	NA	NA	NA	NA
Beryllium	NA	NA	NA	NA	0 20 J	NA	0 45	0 23 J	NA	0 40	NA	NA	NA	NA	NA
Cadmium	NA	NA	NA	NA	0 63 U	NA	0 63 U	0 63 U	NA	0 63 U	NA	NA	NA	NA	NA
Calcium	NA	NA	NA	NA	8 820	NA	442,000	14 800	NA	45 200	NA	NA	NA	NA	NA
Chromium	NA	NA	NA	NA	1 1 U	NA	1 9	1 1 U	NA	1 4	NA	NA	NA	NA	NA
Cobalt	NA	NA	NA	NA	2 6 U	NA	2 6 U	4 3 J	NA	2 6 U	NA	NA	NA	NA	NA

Table 1 (continued)

Groundwater Sampling Results
Buckeye Reclamation Landfill
Belmont County Ohio
July 17 19 and August 7 2001 (a)

Compound	Monitoring Well/Piezometer Number										Trip and Equipment Blank Samples				
Dissolved Metals (continued) (µg/l)	MW 3AA WL	MW 5AA WL	P 19-WL	P 30-GW (b)	P 23-WC	P 24-WC	P 25WC	P 26-US	P 27 US(c)	P 28-US	TB-071701	TB 071801	TB-071901	EB 1	TB080701
Copper	NS	NS	NS	NS	3 0 J	NS	1 3 U	5 2 J	NA	1 6	NA	NA	NA	NA	NA
Iron	NS	NS	NS	NS	2 040	NS	1 150	8 120	NA	1 840	NA	NA	NA	NA	NA
Lead	NS	NS	NS	NS	1 8 U	NS	1 8 U	1 8 U	NA	1 8 U	NA	NA	NA	NA	NA
Magnesium	NS	NS	NS	NS	662 J	NS	203 000	4 280 J	NA	19 700	NA	NA	NA	NA	NA
Manganese	NS	NS	NS	NS	320	NS	3 320	303	NA	215	NA	NA	NA	NA	NA
Nickel	NS	NS	NS	NS	7 9 U	NS	7 9 U	15 9 J	NA	7 9 U	NA	NA	NA	NA	NA
Potassium	NS	NS	NS	NS	55 700	NS	28 000	3 280 J	NA	3 660	NA	NA	NA	NA	NA
Selenium	NS	NS	NS	NS	3 2 U	NS	3 2 U	3 2 U	NA	3 2 U	NA	NA	NA	NA	NA
Silver	NS	NS	NS	NS	0 75 U	NS	0 75 U	1 0 J	NA	0 75 U	NA	NA	NA	NA	NA
Sodium	NS	NS	NS	NS	388 000	NS	217 000	1 130 000	NA	1 050 000	NA	NA	NA	NA	NA
Thallium	NS	NS	NS	NS	6 9 J	NS	5 7 U	5 7 U	NA	5 7 U	NA	NA	NA	NA	NA
Vanadium	NS	NS	NS	NS	4 1 U	NS	4 1 U	4 1 U	NA	4 1 U	NA	NA	NA	NA	NA
Zinc	NS	NS	NS	NS	4 8 J	NS	3 2 U	6 9 J	NA	3 2 U	NA	NA	NA	NA	NA
General Chemistry Parameters (mg/l)															
Total Acidity	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	NA	10 U	NA	NA	NA	10 U	NA
Total Alkalinity	675	553	718	720	878	501	1 070	2 660	2 020	1 060	NA	NA	NA	5 U	NA
Total Organic Carbon (TOC)	7 1	4 0	7 1	8 3	27 1	4 5	8 2	78 1	35 6	5 6	NA	NA	NA	1 U	NA
Chloride	95 6	79 2	118	120	77 1	103	66 4	48 0	99 3	65 2	NA	NA	NA	1 U	NA
Cyanide-amenable	0 010 U	0 010 U	0 010 U	0 010 U	0 010 U	0 010 U	0 010 U	0 010 U	NA	0 010 U	NA	NA	NA	0 010 U	NA
Cyanide-free	0 010 U	0 010 U	0 010 U	0 010 U	0 010 U	0.010 U	0 010 U	0 010 U	NA	0 010 U	NA	NA	NA	0 010 U	NA
Cyanide-total	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	NA	10 U	NA	NA	NA	10 U	NA
Biochemical Oxygen Demand (BOD)	4 7	2 U	2 4	2 4	80 9	66 9	6 9	80 2	NA	8 6	NA	NA	NA	2 U	NA
Chemical Oxygen Demand (COD)	24 2	10 U	26 4	28 6	143	69 9	14 3	242	NA	10 U	NA	NA	NA	10 U	NA
Nitrate Nitrite	0 10 U	0 10 U	0 10 U	0 10 U	0 10 U	0 11	0 10 U	0 10 U	NA	0 10 U	NA	NA	NA	0 10 U	NA
Ammonia Nitrogen	1 5	0 73	0 18 B	0 19 B	0 98	0.49 B	1 9	0 96	NA	1 5	NA	NA	NA	0 12	NA
Oil and Grease	5 U	5 U	5 U	5 U	5 2	5 U	5 U	11 5	5 U	5 U	NA	NA	NA	5 U	NA
Total Dissolved Solids (TDS)	3 010	2 820	2 630	2 550	1 160	905	3 300	3 210	NA	3 200	NA	NA	NA	10 U	NA
Total Suspended Solids (TSS)	35 2	10 4	9 6	6 0	20 4	4 U	38 4	29 0	NA	17 2	NA	NA	NA	4 U	NA
Sulfate	1 410	1 500	1 130	1 070	10 G	50 1	1 560	10 G	5 U	1 450	NA	NA	NA	5 U	NA
Total Sulfide	1 U	1 U	1 U	1 U	1 U	14 8	1 U	1 U	NA	1 U	NA	NA	NA	1 U	NA
Total Phosphorus	0 10 U	0 10 U	0 10 U	0 10 U	0 10 U	0 10 U	0 10 U	0 22	NA	0 10 U	NA	NA	NA	0 10 U	NA
Turbidity (NTUs)	46	8 7	1 7	2	1 080	241	37 4	102	NA	23 4	NA	NA	NA	0 50 U	NA

a/ U=Undetected at method detection limit; J=Estimated concentration, NA=Not analyzed, B=Probable blank contamination, TB=Trip blank; EB=Equipment blank; D=results from a secondary dilution
NS=Not sampled during monitoring event; VOCs=Volatile organic compounds; SVOC=Semi volatile organic compound, PAHs=Polycylic aromatic hydrocarbons
ug/l=Micrograms per liter mg/l=Milligrams per liter NTUs=Nephelometric turbidity units G=elevated detection limit due to matrix interference.

b/ Duplicate sample of P 19 WL.

c/ Specific parameters not analyzed due to insufficient groundwater column

Table A 1

Samples Collected
Buckeye Reclamation Landfill Site
Belmont County Ohio
July 17, 18, 19, and August 7, 2001

Sample	Date Collected	Matrix	Fraction
MW 3AA-WL	07/17/01	water	VOCs PAHs&b2EHP TMet, DMet, NH3 N O&G COD acid. TOC CN amen/total/free BOD Alk TDS TSS NO3/NO2 S P SO4 Cl Turb
MW 5AA WL	07/18/01	water	VOCs, PAHs&b2EHP TMet, DMet, NH3-N O&G COD acid. TOC CN-amen/total/free BOD Alk, TDS TSS NO3/NO2 S P SO4 Cl, Turb
P 19-WL	07/17/01	water	VOCs, PAHs&b2EHP TMet, DMet, NH3 N O&G COD acid. TOC CN-amen/total/free BOD Alk TDS TSS NO3/NO2 S P SO4 Cl, Turb
P 30-WL (b)	07/17/01	water	VOCs, PAHs&b2EHP TMet DMet, NH3 N O&G COD acid. TOC CN amen/total/free BOD Alk TDS TSS NO3/NO2 S P SO4 Cl, Turb
P 23-WC	08/07/01	water	VOCs, PAHs&b2EHP TMet, DMet, NH3 N O&G COD acid. TOC CN amen/total/free BOD Alk, TDS TSS NO3/NO2 S P SO4 Cl Turb
P 24-WC	07/19/01	water	VOCs, PAHs&b2EHP TMet, DMet, NH3-N O&G COD acid. TOC CN-amen/total/free BOD Alk TDS TSS NO3/NO2 S P SO4 Cl, Turb
P 25-WC	07/18/01	water	VOCs PAHs&b2EHP TMet, DMet, NH3 N O&G COD acid. TOC CN amen/total/free BOD Alk TDS TSS NO3/NO2 S P SO4 Cl, Turb
P 26-US	08/07/01	water	VOCs PAHs&b2EHP TMet, DMet, NH3-N O&G COD acid. TOC CN amen/total/free BOD Alk TDS TSS NO3/NO2 S P SO4 Cl, Turb
P 27 US	07/19/01	water	VOCs PAHs&b2EHP TMet, DMet, NH3-N O&G COD acid. TOC CN amen/total/free BOD Alk TDS TSS NO3/NO2 S P SO4 Cl, Turb
P 28-US	07/18/01	water	VOCs PAHs&b2EHP TMet DMet, NH3 N O&G COD acid. TOC CN amen/total/free BOD Alk TDS TSS NO3/NO2 S P SO4 Cl Turb
TB-071701	07/17/01	water	VOCs
TB-071801	07/18/01	water	VOCs
TB-071901	07/19/01	water	VOCs
TB-080701	08/07/01	water	VOCs
EB-1	07/19/01	water	VOCs PAHs&b2EHP TMet DMet, NH3-N O&G COD acid. TOC CN amen/total/free BOD Alk TDS TSS NO3/NO2 S P SO4 Cl Turb

Table A 2

Analytical Holding Times for Samples collected at the
Buckeye Reclamation Landfill Site
Belmont County, Ohio
July 17, 18, 19, and August 7, 2001

VOCS

Sample	Date Collected	Matrix	Date Analyzed	No of Days to Analyze	Holding Time (days)
MW 3AA WL	07/17/01	Water	07/19/01	2	14
MW 5AA WL	07/18/01	Water	07/19/01	1	14
P 19 WL	07/17/01	Water	07/19/01	2	14
P 30-WL	07/17/01	Water	07/19/01	2	14
P 23 WC	08/07/01	Water	08/12/01	5	14
P 24-WC	07/19/01	Water	07/26/01	7	14
P 25 WC	07/18/01	Water	07/19/01	1	14
P 26-US	08/07/01	Water	08/12/01	5	14
P 27 US	07/19/01	Water	07/26/01	7	14
P 28 US	07/18/01	Water	07/19/01	1	14
TB 071701	07/17/01	Water	07/19/01	2	14
TB 071801	07/18/01	Water	07/19/01	1	14
TB 071901	07/19/01	Water	07/26/1901	7	14
TB 080701	08/07/01	Water	08/13/1901	6	14
EB 1	07/19/01	Water	07/26/1901	7	14

PAHs and bis(2-ethylhexylphthalate

Sample	Date Collected	Date Extracted	Date Analyzed	Days to Extract	Days to Analyze	Holding Time (days)
MW 3AA WL	07/17/01	07/19/01	07/24/01	2	5	7 to extr./40 to analysis
MW 5AA WL	07/18/01	07/23/01	07/27/01	5	4	7 to extr./40 to analysis
P 19 WL	07/17/01	07/19/01	07/24/01	2	5	7 to extr./40 to analysis
P 30-WL	07/17/01	07/19/01	07/24/01	2	5	7 to extr./40 to analysis
P 23 WC	08/07/01	08/13/01	08/23/01	6	10	7 to extr./40 to analysis
P 24-WC	07/19/01	07/23/01	07/31/01	4	8	7 to extr./40 to analysis
P 25 WC	07/18/01	07/23/01	07/27/01	5	4	7 to extr /40 to analysis
P 26 US	08/07/01	08/13/01	08/23/01	6	10	7 to extr./40 to analysis
P 27 US	07/19/01	07/23/01	07/31/01	4	8	7 to extr./40 to analysis
P 28 US	07/18/01	07/23/01	07/27/01	5	4	7 to extr /40 to analysis
EB 1	07/19/01	07/23/01	07/31/01	4	8	7 to extr /40 to analysis

Total and Dissolved Metals

Sample	Date Collected	Date Metals Analyzed	Days to Analyze	Holding Time (days)
MW 3AA WL	07/17/01	07/27/01	10	180/Hg 28
MW 5AA WL	07/18/01	07/27/01	9	180/Hg 28
P 19 WL	07/17/01	07/27/01	10	180/Hg 28
P 30-WL	07/17/01	07/27/01	10	180/Hg 28
P 23 WC	08/07/01	08/13/01	6	180/Hg 28
P 24-WC	07/19/01	07/27/01	8	180/Hg 28
P 25 WC	07/18/01	07/27/01	9	180/Hg 28
P 26 US	08/07/01	08/13/01	6	180/Hg 28
P 27 US	07/19/01	07/27/01	8	180/Hg 28
P 28 US	07/18/01	07/27/01	9	180/Hg 28
EB 1	07/19/01	07/27/01	8	180/Hg 28

Table A 2 (continued)

Analytical Holding Times for Samples collected at the Buckeye Reclamation Landfill Site Belmont County, Ohio July 17, 18, 19, and August 7, 2001

Acidity

Sample	Date Collected	Date Analyzed	Days to Analyze	Holding Time (days)
MW 3AA WL	07/17/01	07/20/01	3	14 days
MW 5AA WL	07/18/01	07/20/01	2	14 days
P 19 WL	07/17/01	07/20/01	3	14 days
P 30-WL	07/17/01	07/20/01	3	14 days
P 23 WC	08/07/01	08/13/01	6	14 days
P 24-WC	07/19/01	07/30/01	11	14 days
P 25 WC	07/18/01	07/20/01	2	14 days
P 26 US	08/07/01	08/13/01	6	14 days
P 27 US	07/19/01	07/20/01	1	14 days
P 28 US	07/18/01	07/20/01	2	14 days
EB 1	07/19/01	07/30/01	11	14 days

Alkalinity

Sample	Date Collected	Date Analyzed	Days to Analyze	Holding Time (days)
MW 3AA WL	07/17/01	07/23/01	6	14 days
MW 5AA WL	07/18/01	07/23/01	5	14 days
P 19 WL	07/17/01	07/23/01	6	14 days
P 30-WL	07/17/01	07/23/01	6	14 days
P 23 WC	08/07/01	08/10/01	3	14 days
P 24-WC	07/19/01	07/23/01	4	14 days
P 25 WC	07/18/01	07/23/01	5	14 days
P 26 US	08/07/01	08/10/01	3	14 days
P 27 US	07/19/01	07/23/01	4	14 days
P 28 US	07/18/01	07/23/01	5	14 days
EB 1	07/19/01	07/23/01	4	14 days

TOC

Sample	Date Collected	Date Analyzed	Days to Analyze	Holding Time (days)
MW 3AA WL	07/17/01	07/19/01	2	28 Days
MW 5AA WL	07/18/01	07/19/01	1	28 Days
P 19 WL	07/17/01	07/19/01	2	28 Days
P 30-WL	07/17/01	07/19/01	2	28 Days
P 23 WC	08/07/01	08/10/01	3	28 Days
P 24-WC	07/19/01	07/20/01	1	28 Days
P 25 WC	07/18/01	07/19/01	1	28 Days
P 26 US	08/07/01	08/10/01	3	28 Days
P 27 US	07/19/01	07/20/01	1	28 Days
P 28 US	07/18/01	07/19/01	1	28 Days
EB 1	07/19/01	07/20/01	1	28 Days

Table A 2 (continued)

Analytical Holding Times for Samples collected at the
Buckeye Reclamation Landfill Site
Belmont County, Ohio
July 17, 18, 19, and August 7, 2001

Chloride

Sample	Date Collected	Date Analyzed	Days to Analyze	Holding Time (days)
MW 3AA WL	07/17/01	07/27/01	10	28 Days
MW 5AA WL	07/18/01	07/27/01	9	28 Days
P 19 WL	07/17/01	07/27/01	10	28 Days
P 30-WL	07/17/01	07/27/01	10	28 Days
P 23-WC	08/07/01	08/09/01	2	28 Days
P 24-WC	07/19/01	07/27/01	8	28 Days
P 25-WC	07/18/01	07/27/01	9	28 Days
P 26-US	08/07/01	08/09/01	2	28 Days
P 27 US	07/19/01	07/27/01	8	28 Days
P 28 US	07/18/01	07/27/01	9	28 Days
EB 1	07/19/01	07/27/01	8	28 Days

Cyanide(amenable, total, free)

Sample	Date Collected	Date Analyzed	Days to Analyze	Holding Time (days)
MW 3AA WL	07/17/01	07/24/01	7	28 Days
MW 5AA WL	07/18/01	07/24/01	6	28 Days
P 19 WL	07/17/01	07/24/01	7	28 Days
P 30-WL	07/17/01	07/24/01	7	28 Days
P 23 WC	08/07/01	08/16/01	9	28 Days
P 24-WC	07/19/01	07/24/01	5	28 Days
P 25 WC	07/18/01	07/24/01	6	28 Days
P 26 US	08/07/01	08/16/01	9	28 Days
P 27 US	07/19/01	07/24/01	5	28 Days
P 28 US	07/18/01	07/24/01	6	28 Days
EB 1	07/19/01	07/24/01	5	28 Days

BOD

Sample	Date Collected	Date Analyzed	Days to Analyze	Holding Time (days)
MW 3AA WL	07/17/01	07/18/01	1	2 days
MW 5AA WL	07/18/01	07/19/01	1	2 days
P 19 WL	07/17/01	07/18/01	1	2 days
P 30-WL	07/17/01	07/18/01	1	2 days
P 23 WC	08/07/01	08/09/01	2	2 days
P 24-WC	07/19/01	07/20/01	1	2 days
P 25 WC	07/18/01	07/19/01	1	2 days
P 26 US	08/07/01	08/09/01	2	2 days
P 27 US	07/19/01	07/20/01	1	2 days
P 28 US	07/18/01	07/19/01	1	2 days
EB 1	07/19/01	07/20/01	1	2 days

Table A 2 (continued)

Analytical Holding Times for Samples collected at the Buckeye Reclamation Landfill Site Belmont County, Ohio July 17, 18, 19, and August 7, 2001

COD

Sample	Date Collected	Date Analyzed	Days to Analyze	Holding Time (days)
MW 3AA WL	07/17/01	07/19/01	2	28 days
MW 5AA WL	07/18/01	07/27/01	9	28 days
P 19 WL	07/17/01	07/19/01	2	28 days
P 30-WL	07/17/01	07/19/01	2	28 days
P 23 WC	08/07/01	08/09/01	2	28 days
P 24-WC	07/19/01	07/27/01	8	28 days
P 25 WC	07/18/01	07/27/01	9	28 days
P 26 US	08/07/01	08/09/01	2	28 days
P 27 US	07/19/01	07/27/01	8	28 days
P 28 US	07/18/01	07/27/01	9	28 days
EB 1	07/19/01	07/27/01	8	28 days

Nitrate Nitite

Sample	Date Collected	Date Analyzed	Days to Analyze	Holding Time (days)
MW 3AA WL	07/17/01	07/25/01	8	28 days
MW 5AA WL	07/18/01	07/25/01	7	28 days
P 19 WL	07/17/01	07/25/01	8	28 days
P 30-WL	07/17/01	07/25/01	8	28 days
P 23 WC	08/07/01	08/23/01	16	28 days
P 24-WC	07/19/01	07/25/01	6	28 days
P 25 WC	07/18/01	07/25/01	7	28 days
P 26 US	08/07/01	08/23/01	16	28 days
P 27 US	07/19/01	07/25/01	6	28 days
P 28 US	07/18/01	07/25/01	7	28 days
EB 1	07/19/01	07/25/01	6	28 days

Ammonia Nitrogen

Sample	Date Collected	Date Analyzed	Days to Analyze	Holding Time (days)
MW 3AA WL	07/17/01	07/26/01	9	28 Days
MW 5AA WL	07/18/01	07/26/01	8	28 Days
P 19 WL	07/17/01	07/26/01	9	28 Days
P 30-WL	07/17/01	07/26/01	9	28 Days
P 23 WC	08/07/01	08/14/01	7	28 Days
P 24-WC	07/19/01	07/26/01	7	28 Days
P 25 WC	07/18/01	07/26/01	8	28 Days
P 26 US	08/07/01	08/14/01	7	28 Days
P 27 US	07/19/01	07/26/01	7	28 Days
P 28 US	07/18/01	07/26/01	8	28 Days
EB 1	07/19/01	07/26/01	7	28 Days

Table A 2 (continued)

Analytical Holding Times for Samples collected at the
Buckeye Reclamation Landfill Site
Belmont County, Ohio
July 17, 18, 19, and August 7, 2001

Oil and Grease

Sample	Date Collected	Date Analyzed	Days to Analyze	Holding Time (days)
MW 3AA WL	07/17/01	07/20/01	3	28 Days
MW 5AA WL	07/18/01	07/24/01	6	28 Days
P 19 WL	07/17/01	07/20/01	3	28 Days
P 30-WL	07/17/01	07/20/01	3	28 Days
P 23 WC	08/07/01	08/13/01	6	28 Days
P 24-WC	07/19/01	07/24/01	5	28 Days
P 25 WC	07/18/01	07/24/01	6	28 Days
P 26 US	08/07/01	08/13/01	6	28 Days
P 27 US	07/19/01	07/24/01	5	28 Days
P 28 US	07/18/01	07/24/01	6	28 Days
EB 1	07/19/01	07/24/01	5	28 Days

TDS

Sample	Date Collected	Date Analyzed	Days to Analyze	Holding Time (days)
MW 3AA WL	07/17/01	07/23/01	6	7 Days
MW 5AA WL	07/18/01	07/23/01	5	7 Days
P 19 WL	07/17/01	07/23/01	6	7 Days
P 30-WL	07/17/01	07/23/01	6	7 Days
P 23 WC	08/07/01	08/14/01	7	7 Days
P 24-WC	07/19/01	07/25/01	6	7 Days
P 25 WC	07/18/01	07/23/01	5	7 Days
P 26 US	08/07/01	08/14/01	7	7 Days
P 27 US	07/19/01	07/23/01	4	7 Days
P 28 US	07/18/01	07/23/01	5	7 Days
EB 1	07/19/01	07/25/01	6	7 Days

TSS

Sample	Date Collected	Date Analyzed	Days to Analyze	Holding Time (days)
MW 3AA WL	07/17/01	07/23/01	6	7 Days
MW 5AA WL	07/18/01	07/23/01	5	7 Days
P 19 WL	07/17/01	07/23/01	6	7 Days
P 30-WL	07/17/01	07/23/01	6	7 Days
P 23 WC	08/07/01	08/14/01	7	7 Days
P 24-WC	07/19/01	07/25/01	6	7 Days
P 25 WC	07/18/01	07/23/01	5	7 Days
P 26 US	08/07/01	08/14/01	7	7 Days
P 27 US	07/19/01	07/23/01	4	7 Days
P 28 US	07/18/01	07/23/01	5	7 Days
EB 1	07/19/01	07/25/01	6	7 Days

Table A 2 (continued)

Analytical Holding Times for Samples collected at the Buckeye Reclamation Landfill Site Belmont County, Ohio July 17, 18, 19, and August 7, 2001

Sulfate

Sample	Date Collected	Date Analyzed	Days to Analyze	Holding Time (days)
MW 3AA WL	07/17/01	07/31/01	14	28 days
MW 5AA WL	07/18/01	07/31/01	13	28 days
P 19 WL	07/17/01	07/31/01	14	28 days
P 30-WL	07/17/01	07/31/01	14	28 days
P 23 WC	08/07/01	08/09/01	2	28 days
P 24-WC	07/19/01	07/31/01	12	28 days
P 25 WC	07/18/01	07/31/01	13	28 days
P 26 US	08/07/01	08/09/01	2	28 days
P 27 US	07/19/01	07/31/01	12	28 days
P 28-US	07/18/01	07/31/01	13	28 days
EB 1	07/19/01	07/31/01	12	28 days

Sulfide

Sample	Date Collected	Date Analyzed	Days to Analyze	Holding Time (days)
MW 3AA WL	07/17/01	07/20/01	3	7 days
MW 5AA WL	07/18/01	07/20/01	2	7 days
P 19 WL	07/17/01	07/20/01	3	7 days
P 30-WL	07/17/01	07/20/01	3	7 days
P 23 WC	08/07/01	08/09/01	2	7 days
P 24-WC	07/19/01	07/24/01	5	7 days
P 25 WC	07/18/01	07/20/01	2	7 days
P 26 US	08/07/01	08/09/01	2	7 days
P 27 US	07/19/01	07/20/01	1	7 days
P 28-US	07/18/01	07/20/01	2	7 days
EB 1	07/19/01	07/24/01	5	7 days

Total Phosphorous

Sample	Date Collected	Date Analyzed	Days to Analyze	Holding Time (days)
MW 3AA WL	07/17/01	07/20/01	3	28 days
MW 5AA WL	07/18/01	07/23/01	5	28 days
P 19 WL	07/17/01	07/20/01	3	28 days
P 30-WL	07/17/01	07/20/01	3	28 days
P 23 WC	08/07/01	08/13/01	6	28 days
P 24-WC	07/19/01	07/23/01	4	28 days
P 25-WC	07/18/01	07/23/01	5	28 days
P 26-US	08/07/01	08/13/01	6	28 days
P 27 US	07/19/01	07/23/01	4	28 days
P 28 US	07/18/01	07/23/01	5	28 days
EB 1	07/19/01	07/23/01	4	28 days

Table A 2 (continued)

Analytical Holding Times for Samples collected at the
Buckeye Reclamation Landfill Site
Belmont County, Ohio
July 17, 18, 19, and August 7, 2001

Turbidity

Sample	Date Collected	Date Analyzed	Days to Analyze	Holding Time (days)
MW 3AA WL	07/17/01	07/19/01	2	Immediately upon receipt
MW 5AA WL	07/18/01	07/20/01	2	Immediately upon receipt
P 19 WL	07/17/01	07/19/01	2	Immediately upon receipt
P 30-WL	07/17/01	07/19/01	2	Immediately upon receipt
P 23 WC	08/07/01	08/09/01	2	Immediately upon receipt
P 24-WC	07/19/01	07/21/01	2	Immediately upon receipt
P 25 WC	07/18/01	07/20/01	2	Immediately upon receipt
P 26 US	08/07/01	08/09/01	2	Immediately upon receipt
P 27 US	07/19/01	07/20/01	1	Immediately upon receipt
P 28 US	07/18/01	07/20/01	2	Immediately upon receipt
EB 1	07/19/01	07/21/01	2	Immediately upon receipt

Table A 3

Blank Contamination
Buckeye Reclamation Landfill Site
Belmont County Ohio
July 17 18, 19 and August 7 2001 (a)

Blank	Type	Analyte	Concentration (µg/l)	Associated Samples
TB-071901	Trip Blank	Acetone	6 3 J	MW 3AA WL, P 19-WL P 30-WL
EB 1	Equipment Blank	Acetone	14 J	MW 3AA WL MW 5AA WL P 19-WL, P 30-WL, P 23 WL, P 23 WL, P 24-WL, P 25 WL, P 26-WL P 27 WL, P 28 WL
		Bis(2-ethylhexyl)phthalate	6 5 J	MW 3AA WL, MW 5AA WL, P 19-WL, P 30-WL, P 23 WL, P 23 WL, P 24-WL, P 25 WL P 26-WL P 27 WL, P 28 WL
		Total Barium	0 44 J	MW 3AA WL, MW 5AA WL, P 19-WL, P 30-WL, P 23 WL P 23-WL, P 24-WL, P 25 WL P 26-WL P 27 WL, P 28 WL
		Total Beryllium	0 36 J	MW 3AA WL MW 5AA WL P 19 WL, P 30-WL, P 23 WL P 23-WL P 24-WL, P 25-WL, P 26-WL P 27 WL, P 28 WL
		Total Iron	10 0 J	MW 3AA WL MW 5AA WL P 19 WL, P 30-WL, P 23 WL P 23-WL P 24-WL, P 25 WL P 26-WL P 27 WL, P 28 WL
		Total Zinc	3 6	MW 3AA WL MW 5AA WL P 19-WL P 30-WL, P 23 WL P 23-WL, P 24-WL, P 25 WL, P 26-WL P 27 WL, P 28 WL
		Ammonia Nitrogen	0 12	MW 3AA WL MW 5AA WL P 19-WL, P 30-WL, P 23 WL, P 23-WL, P 24-WL, P 25 WL, P 26-WL P 27 WL, P 28 WL

a/ J = estimated concentration.

Table A 4

Matrix Spike/Matrix Spike Duplicate Results for Organics Analyses
Outside of Recommended QC Limits
Buckeye Reclamation Landfill Site
Belmont County, Ohio
July 17, 18, 19, and August 7, 2001

PAHs & bis(2 ethylhexyl)phthalate

Spiked Sample **P 23 WC**

Compound	MS % Rec	MSD % Rec	MS/MSD QC Limits	% RPD	% RPD QC Limits
Acenaphthene	0 *	0 *	26 118	0 *	35

Table A 5

ICP Serial Dilutions
Outside QC Limits
Buckeye Reclamation Landfill Site
Belmont County, Ohio
July 17, 18, 19 and August 7, 2001 (a)

ICP Serial Dilutions

Analyte	%D	QC Limit
Total Barium	10 2	10
Total Iron	15 1	10

a/ %D = percent difference

Table A 6

Field Duplicate Results
Groundwater Sampling Results
Buckeye Reclamation Landfill Site
Belmont County, Ohio (ug/l)(a)
July 17, 18, 19, and August 7, 2001

Compound	P 19 WL	P 30 GW	RPDs
Total Metals			
Barium	19 3	18 8	2 6%
Beryllium	0 40	0 48	18 2%
Calcium	432 000	437 000	1 2%
Chromium	2 2	2 1	4 7%
Cobalt	4 6	3 2	35 9%
Iron	462	405	13 1%
Magnesium	170 000	170 000	0 0%
Manganese	1 500	1 510	0 7%
Potassium	4 570	4 550	0 4%
Sodium	90 100	89 600	0 6%
Vanadium	5 4	5 5	1 8%
Inorganic Parameters			
Total Alkalinity	718	720	0 3%
Total Organic Carbon (TOC)	7 1	8 3	15 6%
Chloride	118	120	1 7%
Biochemical Oxygen Demand (BOD)	2 4	2 4	0 0%
Chemical Oxygen Demand (COD)	26 4	28 6	8 0%
Ammonia Nitrogen	0 18	0 19	5 4%
Total Dissolved Solids (TDS)	2 630	2 550	3 1%
Total Suspended Solids (TSS)	9 6	6 0	46 2%
Sulfate	1 130	1 070	5 5%
Turbidity (NTUs)	1 7	2	16 2%

a/ RPD = Relative percent difference

Attachment A - Data Qualifier Definitions for Inorganic Data Review

U - The analyte was analyzed for but not detected above the level of the associated value The associated value is the Instrument Detection Limit (IDL) for all analytes except Cyanide (CN) and Mercury (Hg) For CN and Hg, the associated value is the Contract Required Detection Limit (CRDL)

J - The analyte was analyzed for and was positively identified, but the associated numerical value may not be consistent with the amount actually present in the environmental sample

One or more of the following quality control criteria were not met

- Blank contamination indicates possible high bias and/or false positives
- Calibration range exceeded indicates possible low bias and/or false negatives
- Holding times not met indicates possible low bias and/or false negatives
- Other QC outside control limits bias not readily determined

UJ A combination of the "U" and "J" qualifier The analyte was analyzed for but was not detected above the level of the associated value The associated value may not accurately or precisely represent the sample detection limit

B- The result is considered undetected because of probable blank contamination

D- The result is reported from a secondary dilution The sample was diluted because the concentration of one or more analytes was outside the calibration range of the instrument

G- Elevated detection limits, due to matrix interference

Reference U S EPA CLP Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analysis (February 1994)

Attachment B - Data Qualifier Definitions for Organic Data Review

The following definitions provide brief explanations of the national qualifiers assigned to results in the data review process

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit

J - The analyte was positively identified the associated numerical value is the approximate concentration of the analyte in the sample

UJ- The analyte was not detected above the reported sample quantitation limit However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample

B- The result is considered undetected because of probable blank contamination

Reference U S EPA CLP National Functional Guidelines for Organic Data Review (February 1994)